Just for your Tandy Color Computer 1, 2 and 3

August 1988

Canada $4.95 U.S. $3.95

The RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

Our Annual Games Issue!

All the Right Moves

CoCo Chess, Sea War,
Talking Bingo and
Escape From Tut's Tomb

Learn to Create High-Quality Games in Assembly Language

Keep Track of the Body Count in Role-Playing Games

Compare Disk Files for Duplicates

Convert ML Into BASIC

r Comparison Chart,
re Mapping Techniques,
Switcheroo II and More!

SUB 38538 EXP 8809 RBOW08/88
HARRY N HARMON
1404 VILLAGE AVE
LOVELAND CO 80538

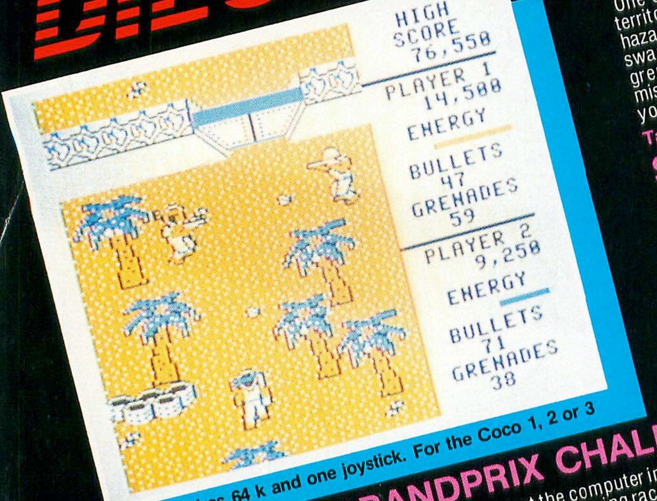
08
001

DIECOM PRODUCTS INC.

MISSION: RUSH'N ASSAULT

One or two players can take on the mission to rescue POW'S hidden deep inside enemy territory. Watch out for enemy soldiers, snipers, grenade launchers and many other hazards as you journey farther over enemy lines. Forge your way through jungles and swamps and other hazardous terrain as you search for the missing soldiers. Pick up grenades, extra ammo and more powerful weapons as you continue farther into your mission. The enemy is out in great force to stop your mission. Dozens of screens will keep you playing for hours. Can you succeed and rescue the prisoners? Only time will tell!

Tape or Disk
$28.95 U.S.
$38.95 Can.

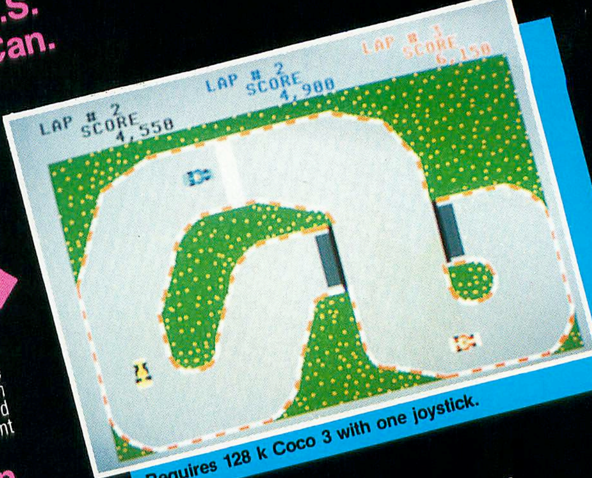

HIGH SCORE 76,550
PLAYER 1 14,500
ENERGY
BULLETS 47
GRENADES 59
PLAYER 2 9,250
ENERGY
BULLETS 71
GRENADES 38

Requires 64 k and one joystick. For the Coco 1, 2 or 3

GRANDPRIX CHALLENGE

Race alone against the computer, or with a friend against the computer in this high speed racing game. You compete in 5 lap races around twisting and turning race courses. Finish the race ahead of all the computer cars and you will progress to a more challenging course. Collect repair tools as you race around the track and you will be able to increase the speed and handling of your race car. But watch out for oil slicks and water puddles on the track or you might find your car crashing into a wall. Detailed 320 × 200 graphics and realistic driving conditions make this a must for your Coco 3 collection. Many different race tracks will keep you challenged.

Disk **$28.95 U.S $38.95 Can.**

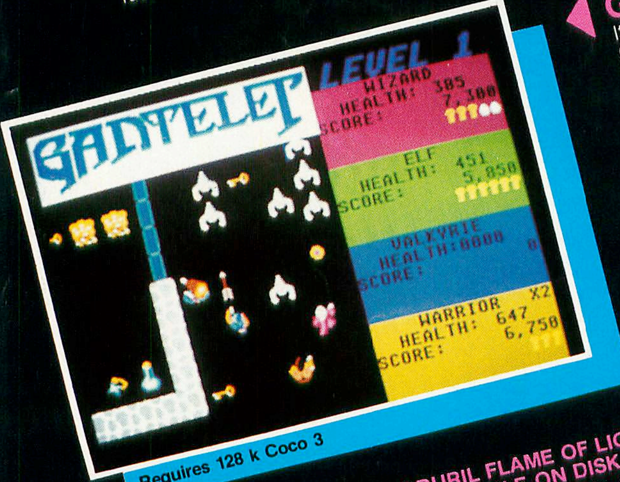

LAP # 2 SCORE 4,550
LAP # 2 SCORE 4,900
LAP # 3 SCORE 6,150

Requires 128 k Coco 3 with one joystick.

GANTELET II

It's back and better than ever. It's Gantelet II for your Coco 3. Using 320 × 200 hi-res graphics with 16 colors, we have created one of the best arcade style games you will ever see for your Coco. Four people can now play simultaneously in one game. Dozens of new levels with new monsters will challenge even the best players. Collect keys to open doors and chests, treasures, and many new magic potions to help you battle more powerful monsters. Watch out for hidden traps as you search for the exit to next level.

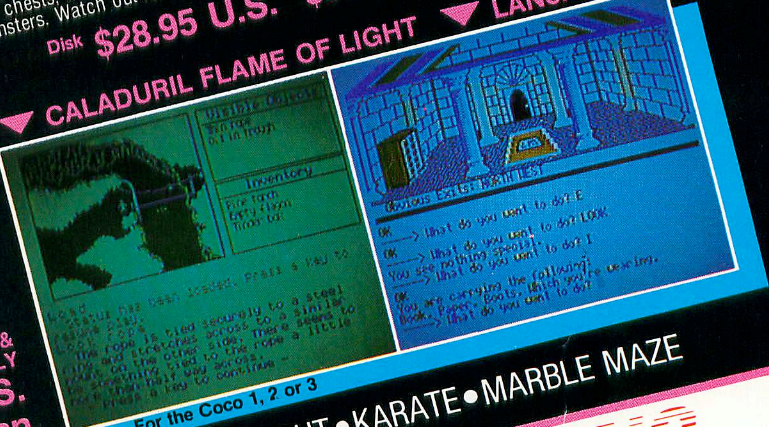
Disk **$28.95 U.S. $38.95 Can.**


GANTELET
LEVEL 1
WIZARD 385
HEALTH: 7,300
SCORE:
ELF 451
HEALTH: 5,850
SCORE:
VALKYRIE
HEALTH: 0000
SCORE:
WARRIOR 647 X2
HEALTH: 6,750
SCORE:

Requires 128 k Coco 3

CALADURIL FLAME OF LIGHT

LANSFORD MANSION



For the Coco 1, 2 or 3

NEW LOW PRICE ON CALADURIL FLAME OF LIGHT & LANSFORD MANSION, AVAILABLE ON DISK ONLY
$28.95 U.S.
$38.95 Can.

ALSO AVAILABLE: MISSION: F-16 ASSAULT • PAPER ROUTE • KNOCK OUT • KARATE • MARBLE MAZE

$28.95 U.S.
$38.95 CAN.
AVAILABLE ON TAPE OR DISK
64K REQUIRED

DIECOM PRODUCTS INC.

6715 FIFTH LINE, MILTON, ONT., CANADA L9T 2X8

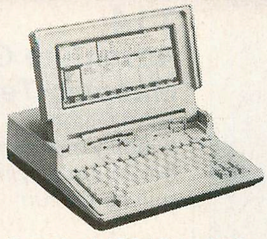
We accept:
VISA
MasterCard
cheque or money order

24 hr. order line:
(416) 878-8358
personal service 9-5

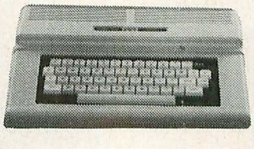
Please add $2 shipping & handling (for 'The Rat' and 'Iron Forest' add $5 each for shipping). Ontario residents add 7% sales tax. C.O.D. Canada only.

From Computer Plus to YOU...

PLUS after PLUS after PLUS

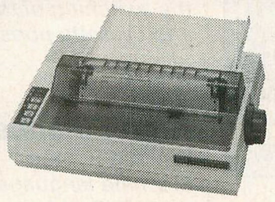


Tandy 1400 LT $1239
Tandy 102 24K $379
Tandy 200 24K $429

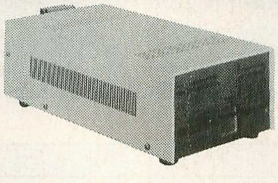


Color Computer 3
w/128K Ext. Basic $159

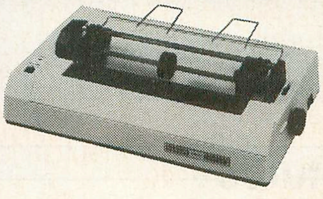
Tandy 1000 HX $539
Tandy 1000 TX $849*



DMP-132 $289



Color Computer Disk Drive
Drive 0 $249 Drive 1 $149



DMP-106 $169

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS

Tandy 1000 HX 1 Drive 256K	539.00
Tandy 1000 TX 1 Drive 640K	849.00*
Tandy 1000 SX 1 Drive 384K	499.00*
Tandy 3000 HL 1 Drive 512K	1129.00
Tandy 4000 1 Drive 1 Meg. Ram	1959.00

PRINTERS

Radio Shack DMP-106 80 CPS	169.00
Radio Shack DMP-132 120 CPS	289.00
Radio Shack DMP-440 300 CPS	549.00
Radio Shack DWP-230 Daisy Wheel	349.00
Tandy LP-1000 Laser Printer	1699.00
Star Micronics NX-1000 144 CPS	199.00
Star Micronics NX-15 120 CPS	359.00
Panasonic P-1080i 144 CPS	199.00
Panasonic P-1091i 194 CPS	249.00
Panasonic P-1092i 240 CPS	349.00
Okidata 182+ 144 CPS	259.00
Okidata 192+ 200 CPS	359.00
Okidata 292 240 CPS	479.00

MODEMS

Radio Shack DCM-6	52.00
Radio Shack DCM-7	85.00
Practical Peripheral 2400 Baud	229.00
Practical Peripheral 1200 Baud	149.00

COLOR COMPUTER MISC.

Radio Shack Drive Controller	99.00
Extended Basic Rom Kit	14.95
64K Ram Upgrade Kit	39.00
Radio Shack Deluxe Keyboard Kit	24.95
HI-RES Joystick Interface	8.95
Color Computer Deluxe Mouse	44.00
Multi Pak Interface	89.00
Multi Pak Pal Chip for COCO 3	14.95
CM-8 6' Extension Cable	19.95
Serial to Parallel Conv.	59.95
Radio Shack Deluxe Joystick	26.95
Magnavox 8515 RGB Monitor	329.00
Radio Shack CM-8 RGB Monitor	249.00
Radio Shack VM-4 Green Monitor	99.00
PBJ 512K COCO 3 Upgrade	139.00
Tandy 512K COCO 3 Upgrade	149.00
Mark Data Universal Video Driver	29.95

COLOR COMPUTER SOFTWARE

	TAPE	DISK
The Wild West (CoCo3)		25.95
Worlds Of Flight	34.95	34.95
Mustang P-51 Flight Simul.	34.95	34.95
Flight 16 Flight Simul.	34.95	34.95
COCO Util II by Mark Data		39.95
COCO Max II by Colorware		79.95
COCO Max III by Colorware		79.95
AutoTerm by PXE Computing	29.95	39.95
TelePatch III by Spectrum		29.95
TW-80 by Spectrum (CoCo3)		39.95
TeleWriter 64	49.95	59.95
Elite Word 80		79.95
Elite Calc 3.0		69.95
CoCo3 512K Ram Disk by CerComp		19.95
Home Publisher by Tandy (CoCo3)		35.95
Sub Battle Sim. by Epyx (CoCo3)		26.95
Thexder by Sierra (CoCo3)		22.45
Kings Quest III by Sierra (CoCo3)		31.45
Flight Sim. II by SubLogic (CoCo3)		31.45
OS-9 Level II by Tandy		71.95
OS-9 Development System		89.95
Multi-View by Tandy		44.95
VIP Writer (disk only)		69.95
VIP Integrated Library (disk)		149.95

*Sale prices through 8/30/88
Prices are subject to change without notice. Please call for shipping charges. Prices in our retail store may be higher. Send for complete catalog.

CALL TOLL FREE
1-800-343-8124

- *LOWEST POSSIBLE PRICES*
- *BEST POSSIBLE WARRANTY*
- *KNOWLEDGEABLE SALES STAFF*
- *TIMELY DELIVERY*
- *SHOPPING CONVENIENCE*

VISA AMERICAN EXPRESS MasterCard

computer plus

P.O. Box 1094
480 King Street
Littleton, MA 01460

SINCE 1973

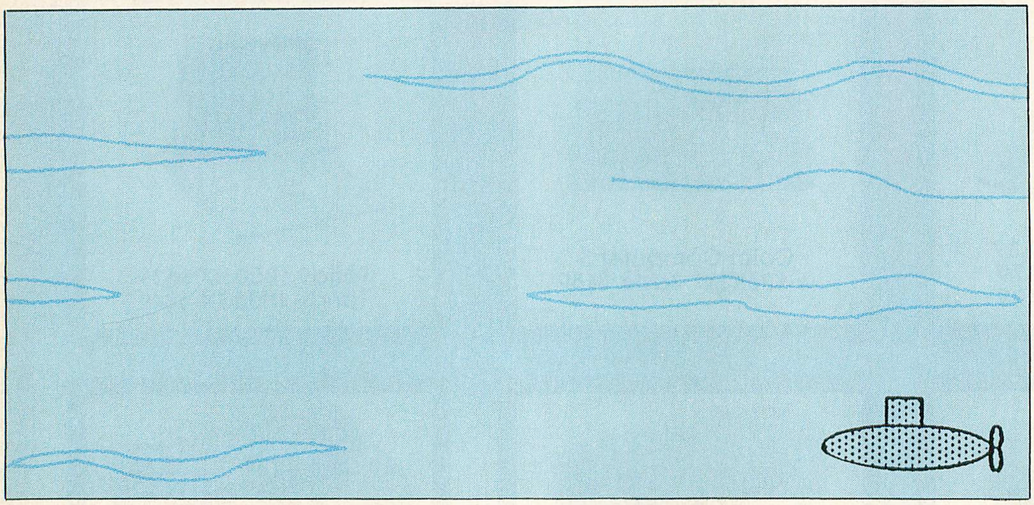
IN MASSACHUSETTS CALL (617) 486-3193

TRS-80 is a registered trademark of Tandy Corp.

RAINBOW

Table of Contents

August 1988
Vol. VIII No. 1



20

Features

16
The Crazy Pool Ball Explained
Bruce W. Ronald
Solution to last month's logic problem

20
Sea War
Jeff Hameluck
There are ships out there — waiting for you!

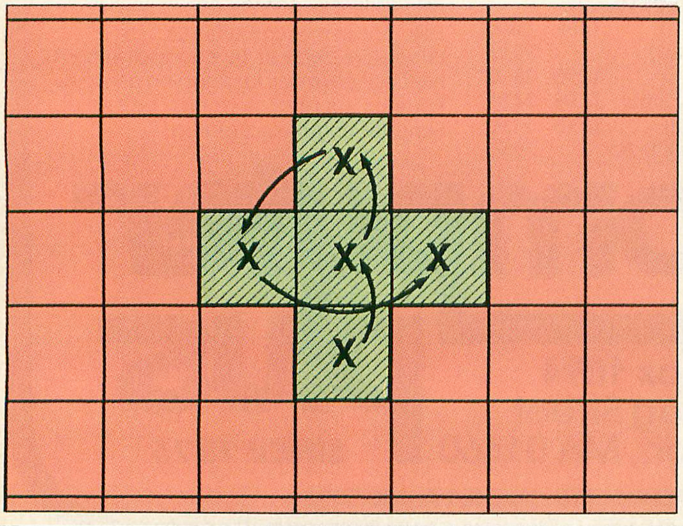
28
It's Your Move
Joel F. Klein
Test your skill with this strategic game of chess

36
CoCo Takes a Hint
Dennis H. Weide
A program to help you compare disk files for duplicates

38
Bingo the CoCo Way
Bruce K. Bell, O.D.
An old favorite with some added bells and whistles

44
Child's Play
Bill Bernico
You won't lose the pieces in this bug-making game!

102



53
Emphasize with the DMP-105
David Francis
Printing in italics on the Tandy DMP-105 printer

58
Escape from Tut's Tomb, Parts 2 and 3
Chris McKernan
Just when you thought it was safe to go back into the tombs . . .

87
The "Hit" List
Andrew Dater
Keep track of the body count in role-playing games

100
ML-Data
Stephen Miller
A routine to convert a machine language program into BASIC

102
The Little Graphics Library
Kevin Dowd
A tutorial to help you create great games and Simulations in CoCo's own language

114
Adventure Game Mapping Techniques
John Dillon
Simplify and organize Adventure playing without ruining the fun

120
The Old Switcheroo II
Mark Haverstock
A hardware project to handle the switching of the joystick and cassette ports

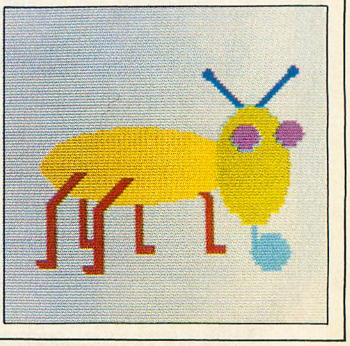
137
High Finances
William P. Nee
Machine language made BASIC, Part 2

142
Printer Diversions and Conversions
Cray Augsburg
Using control codes to enhance your printer's capabilities

150
Are You Missing Something?
Roger D. Dowd
Isolating and repairing keyboard problems

156
Working Together: Delphi and Tape I/O
Don Hutchison
Downloading programs using Radio Shack's Direct Connect Modem Pak

44



Novices Niche

76
Seeking Immortality
Paul Alger

77
Minding Your X's and Y's
James Kevin Lowry

78
Space Attack
John T. Wells

78
Winging It
Chad Presley

79
What's Missing?
Keiran Kenny

The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ad on Page 52.

Columns

82
BASIC Training
Joseph Kolar
The "Encyclopedia CoColoria"

162
CoCo Consultations
Marty Goodman
Just what the doctor ordered

152
Delphi Bureau
Cray Augsburg
Help and a place of your own, and Hutchison's database report

165
Doctor ASCII
Richard Esposito
The question fixer

80
Education Notes
Steve Blyn
Interpreting a newspaper collection chart

10
PRINT#-2,
Lawrence C. Falk
Editor's notes

167
Turn of the Screw
Tony DiStefano
All about serial packs

92
Wishing Well
Fred Scerbo
Matching opposites

Rainbowtech

170
Barden's Buffer
William Barden, Jr.
Assembly language interrupts and BASIC "internals"

182
KISSable OS-9
Dale L. Puckett
Volunteers build a better mousetrap

Product Reviews

Flight Simulator II/*SubLOGIC Corporation* ____ 132
Fraze Craze/*RAM Electronics* ____ 128
In Quest of the Star Lord/*Sundog Systems* ____ 133
Mini Database/*Tothian Software, Inc.* ____ 133
Power Stones of Ard/*Three C's Projects* ____ 134
RS-232 Switcher/*Radcomp Computers* ____ 135
Syntrax 2.0/*Intercomp Sound* ____ 128
Thexder/*Sierra On-Line, Inc.* ____ 134
Wargame Designer/*SPORTSware* ____ 126

Departments

Advertisers Index ____ 192
Back Issue Info ____ 71
CoCo Cat ____ 33
CoCo Gallery ____ 34
Hints ____ 169
Letters to Rainbow ____ 6
Maxwell Mouse ____ 41
One-Liners ____ 81, 89, 117
Racksellers ____ 190
Rainbow Info ____ 14
Received & Certified ____ 136
Scoreboard ____ 84
Scoreboard Pointers ____ 86
Submitting Material to Rainbow ____ 187
Subscription Info ____ 189

THE RAINBOW is published every month of the year by FALSOFT, Inc., The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059, phone (502) 228-4492. **THE RAINBOW**, **RAINBOWfest** and **THE RAINBOW** and **RAINBOWfest** logotypes are registered ® trademarks of FALSOFT, Inc. • Second class postage paid Prospect, KY and additional offices. USPS N. 705-050 (ISSN No. 0746-4797). POSTMASTER: Send address changes to **THE RAINBOW**, P.O. Box 385, Prospect, KY 40059. Authorized as second class postage paid from Hamilton, Ontario by Canada Post, Ottawa, Ontario, Canada.

• Entire contents copyright © by FALSOFT, Inc., 1988. **THE RAINBOW** is intended for the private use and pleasure of its subscribers and purchasers and reproduction by any means is prohibited. Use of information herein is for the single end use of purchasers and any other use is expressly prohibited. All programs herein are distributed in an "as is" basis, without warranty of any kind whatsoever. • Tandy, Color BASIC, Extended Color BASIC and Program Pak are registered ® trademarks of the Tandy Corp.

• Subscriptions to **THE RAINBOW** are $31 per year in the United States. Canadian rates are U.S. $38. Surface mail to other countries is U.S. $68, air mail U.S. $103. All subscriptions begin with next available issue. • Limited back issues are available. Please see notice for issues that are in print and their costs. Payment accepted by VISA, MasterCard, American Express, cash, check or money order in U.S. currency only. Full refund after mailing of one issue. A refund of 10/12ths the subscription amount after two issues are mailed. No refund after mailing of three or more magazines.

The Rainbow

Editor and Publisher
Lawrence C. Falk
Managing Editor Jutta Kapfhammer
Associate Editor Sue Fomby
Reviews Editor Lauren Willoughby
Submissions Editor Angela Kapfhammer
Copy Editor Beth Haendiges
Technical Editors Cray Augsburg, Ed Ellers
Technical Assistant David Horrar
Editorial Assistants Sue H. Evans, Wendy Falk
Contributing Editors
William Barden, Jr.,
Steve Blyn, Tony DiStefano,
Richard Esposito,
Martin Goodman, M.D.,
Joseph Kolar, Dale Puckett,
Fred Scerbo, Richard White
Art Director Heidi Maxedon
Designers Sharon Adams, Robert Hatfield, Jr., Denise Webb
Typesetter Eloise Gaines

Falsoft, Inc.

President Lawrence C. Falk
General Manager Bonnie Frowenfeld
Asst. General Mgr. for Finance Donna Shuck
Admin. Asst. to the Publisher Sarah Levin
Editorial Director John Crawley
Asst. Editorial Director Judi Hutchinson
Senior Editor T. Kevin Nickols
Director of Production Jim Cleveland
Chief Bookkeeper Diane Moore
Dealer Accounts Judy Quashnock
Asst. General Manager For Administration Sandy Apple
Word Processor Manager Patricia Eaton
Customer Service Manager Beverly Bearden
Customer Service Representative Carolyn Fenwick
Development Coordinator Ira Barsky
Chief of Printing Services Melba Smith
Dispatch Tony Olive
Business Assistants Anne Brooks, Laurie Falk
Chief of Building Security and Maintenance Jessie Brooks
Advertising Coordinator Doris Taylor
Advertising Representatives Belinda Kirby, Kim Vincent
Advertising Assistant Debbie Baxter
(502) 228-4492

For RAINBOW Advertising and Marketing Office Information, see Page 192

Cover photograph copyright © 1988 by John R. Longino
Art direction by Heidi Maxedon

Letters to the RAINBOW

BACK TALK

Editor:

I read the "Building May's Rainbow" column, and I'm surely glad to hear that there are plans to diversify the magazine instead of sticking so rigidly to the monthly theme. The magazine has become quite predictable because of the theme format.

I'm also glad to hear that you plan to publish a cross-reference to the various printers, showing the different printer codes and what they do. There are some great programs in this year's Printer issue, but I'm not able to utilize many of them. I use an Epson printer, and many of the Tandy DMP printer codes are quite different from the Epson's. I'm sure there are many CoCoists who use different printers on the market. By the time the next Printer issue comes around, let's hope that there will be some kind of cross-reference so we can use the programs in that issue.

Val Burke
Red Oak, GA

There's no need to wait for our next Printer issue, Val. See Cray Augsburg's "Printer Diversions and Conversions" beginning on Page 142 of this issue.

A Different Prescription

Editor:

There were a couple of questions and answers in the May '88 "Dr. ASCII" column that I would like to comment on.

First of all, the "Dr. ASCII" column is worth its weight in hard disks, and both answers were correct. I'd simply like to provide alternate solutions to the reader's questions. (Besides, it gave me another good excuse to use Delphi.)

In the first question, titled "If You Fall Into an Error Trap," Mr. Lute states that on his CoCo 3, an FC Error comes up as error number -1, instead of error number 4, as the manual states. His problem just might be that he is trying to get the Error Number (ERNO) value from the direct mode (that's when the CoCo is waiting for you to insert or edit lines, etc.). When the CoCo 3 enters the direct mode, it resets the value of ERNO to -1. So no matter what the actual error number was, the result would always be -1.

To solve the problem, you might insert a statement like: `ER=ERNO:EL=ERLIN` into your error trap routine. Then when the program halts because of an error, you can type: `PRINT ER,EL` and get correct results.

In the second question, titled "High Poking Disk BASIC 1.1," Mr. Bradley wants to know why his disk gets trashed in the double speed mode, while some other people use it all of the time with no troubles at all. The Dr. says it's probably caused by an old 12-volt disk controller.

It might also be caused by the drive itself. Disk BASIC uses a series of fixed time delays when accessing the disk drive. The one that causes the most trouble when using the double speed mode is the track-to-track step rate.

If you're using drives with a 30-ms step rate, which is standard for the older drives (and Disk BASIC), and you try using the double speed mode, you're pushing the drive past its speed limit because the 30-ms time delay is converted to 15-ms when using the double speed mode. The person that is having no trouble in high speed might be using drives that can handle 15-ms — or faster — step rates.

Ken F. Halter
Chino, CA

REVIEWING REVIEWS

Editor:

I wish to comment on both the product, *Telewriter-128*, and the review of it in the May '88 issue.

The excellent review caused me to buy the product, which is superb. Indeed, the review seriously understates the excellence of this latest *Telewriter*. However, I would like to provide one or two suggestions and minor criticisms that may save other readers time when they install *TW-128*; I'll cover those first.

Older versions of *Telewriter* were sometimes DOS-sensitive; they would run fine under Disk BASIC, but misbehave under the more advanced optional DOSs some of us use. The review should have stated that *TW-128* is more widely compatible; I am running it primarily on ADOS-3, but I have run it on four other DOSs, only one of which was Disk BASIC. There was one minor glitch — the `CONVRT64` auxiliary program (for transferring old *TW-64* `.BIN` files to *TW-128* `.TXT` format) is DOS-sensitive in Line 450. If it hangs on, you go to a different DOS. That auxiliary program is only used occasionally, so this is not a significant glitch. However, the entire documentation to `CONVRT64` is inside the program just after it hangs, which leads me to a frustrating hour or so!

Nowhere in the documentation does it state whether this version is compatible with a RAM disk. Earlier ones were not, so it would be nice to know. However, so far none of my files have been big enough to try my RAM disk; and with a 48K buffer, few users will need one.

There should be some way to dump the eight screens of help listings to hard copy. CTRL-H is fast, easy, well-written and convenient. But I want to screen dump it for my file folder and haven't been able to so far. How does one do that?

The review fails to mention one vital point: The macros allow recursive use! It's not even mentioned in the manual. Why is that important? It took me six macros to define all the non-printing junk with which I frequently preface my documents — tab settings, embedded control codes, formatting instructions, and a short, non-printing description of each of these. Because each macro can be included in other macros, I was able to define a series of single-stroke macros to provide all the non-printing stuff plus my home or business letterhead. On earlier versions, I kept a series of dummy files to read in and append to for this purpose. Now, instead of four or five such files, I have one systems file, `TW*DEFS`, which sets up all of these with a single keystroke at the start of any document.

TW-128 deserves even more praise than RAINBOW gave it.

H. Larry Elman
Port Jefferson, NY

HINTS & TIPS

Editor:

My old CoCo 1 "died" and was replaced with a new CoCo 3. As I am a one-hand, one-finger typist, I was scared stiff. All those special extra keys were quite intimidating to me.

As I struggled to master the monster, it gradually dawned on me that this new CoCo 3 was easier to use than the CoCo 1. The CTRL key gives me an un-shifted =, and both CTRL and ALT are duplicated at the right side of the keyboard. So, only a few exotic moves are barred to me. (I have little desire to gaze at the picture of the three bearded magi imbedded in the CoCo 3 guts.)

A new generation of users needs to be informed of the `A` and `E` commands in the edit mode. Microsoft seems to have carried over the edit module from the programs in other early Tandy micros. The `E` command is valuable because it allows you to escape from a mistake, putting you back in the command mode at square one, so you can untangle your fingers and re-enter edit mode without loss of ten minutes' labor.

The `A` command seems to do what the `L` command does — print the line and put you at the beginning.

I see the CoCo 3 still has the old `DLOAD` command, no longer operative from Disk BASIC. Vas dere a reason for dis, or vas it chust sloppy verk by der magi?

Bob Russ
Walworth, WI

RUNS ON COCO 2 & 3

AUTOTERM
TURNS YOUR COLOR COMPUTER INTO THE
WORLD'S SMARTEST TERMINAL!
YOU'LL ALSO USE AUTOTERM FOR SIMPLE WORD PROCESSING & RECORD KEEPING

EXTRA FEATURES ON COCO 3 DISK
80 char. screen, 2400 baud thru serial port,
95,000 to 475,000 character buffer.

EASY COMMUNICATION + WORD PROCESSING + TOTAL AUTOMATION

Full prompting and error checking. Step-by-step manual has examples. Scroll text backward and forward. No split words on screen or printout. Save, load, delete files while on line. Print, save all or any part of text. 300 or 1200 baud. All 128 ASCII characters. Works with D.C. Hayes or any modem. Screen widths of 32, 40, 42, 51, 64.
DISK VERSION SUPPORTS RS232 PAK, XMODEM and SPLIT SCREEN FOR PACKET RADIO.

Please hire the mentally retarded. They are sincere, hard working and appreciative. *Thanks!* *Phyllis.*

Editing is super simple with the cursor. Find strings instantly too! Insert printer control codes. Specify page size and margins. Switch quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text or files, download information, file it, and sign-off; then edit the receive data, print it in an attractive format, and/or save it on file. Compatible with TELEWRITER.

CASSETTE $29.95
DISKETTE $39.95
Add $3 shipping and handling
MC/VISA/C.O.D.

Advanced system of keystroke macros lets you automate any activity, such as dial via modem, sign-on, interact, sign-off, print, save. Perform entire session. Act as message taker. At start-up, disk version can automatically set parameters, dial, sign-on, interact, read/write disk, sign-off, etc. Timed execution lets AUTOTERM work while you sleep or play. No other computer can match your COCO's intelligence as a terminal.

PXE Computing
11 Vicksburg Lane
Richardson, Texas 75080
214/699-7273

Saving CoCo's Three Wise Men

Editor:

Here's a trick for the new CoCo 3. Almost everyone knows that when you press CTRL and ALT with the reset button pressed, you get a picture with three people and their names. So what's the new trick? The picture is stored on the `PMODE4` graphics screen. When viewing this screen, you will see only the three people (not their names). To save this screen use the following steps: First, type `PCLS1` and press ENTER. Press CTRL and ALT. Leaving them down, press the reset button. Release CTRL and ALT, press the reset button again, and the computer will cold start. Next, type in the following lines:

```
10 PMODE4:SCREEN1,1
20 CSAVEM"COCOTRIO",1536,7679,1536
```

Press the record button on your tape recorder and run the program. After the program is done, rewind the recorder to the beginning of the file and change Line 20 to: `20 CLOADM"COCOTRIO"`. Press play and run the program. To have the screen on disk, type in Line 20 as: `20 SAVEM"COCOTRIO",3584,9727,3584`, have your disk in the disk drive and run the program. Then change Line 20 to: `20 LOADM"COCOTRIO"` and type Line 30 as: `30 GOTO 30`. Run the program.

Mike Craig
South Haven, MI

REQUEST HOTLINE

Editor:

I got my first CoCo in 1984, and I had a subscription to RAINBOW for two years. I stopped my subscription because I outgrew it. I know you've got to keep the little tykes entertained, but how about me? I'm 36 years old.

At work I am building an equipment monitoring system using a CoCo that has 24 slave 8255 chips selected by a primary and a secondary master 8255 chip and an using techniques found in your magazine. The system is about 50 percent operative.

I've become sick and tired of slow BASIC program games, and I don't want to bother with OS-9. Assembly language programming is what I want to learn — specifically how to program graphics games using Radio Shack's Assembler. I have *TRS 80 Color Computer Assembly Language Programming* by William Barden, but it is definitely not game-oriented. I also have a copy of Don Inman's *Assembly Language Graphics for the TRS 80 Color Computer*, but it was written for a different assembler; as expected, when I type in the programs, they don't work.

Would you please devote a section in RAINBOW to helping me and many others grow into a higher level of programming, using assembly language game tutorials? I am ready to advance beyond Beginner's All Purpose, Symbolic Instruction Code.

Richard T. Maelhorn
State College, PA

See William Nee's second installment of "Machine Language Made BASIC on Page 137 of this issue. His 13-part series of ML tutorials, which began in last month's issue, will continue monthly through August '89.

Also, check out "The Little Graphics Library" by Kevin Dowd on Page 102 of this issue.

Printer Codes

Editor:

All of us have various types of printers; when a truly great program comes along and the author has not included the remarks regarding setting the printer codes, it is very frustrating to those who are not great programmers — or not programmers at all.

It would be a great service if this was one of the requirements when submitting a program to RAINBOW. In most cases, we can then go to our individual printer books, look up and change the codes, and *voila*, the program works.

I was very happy to see in the May issue one or two programs where the authors did this, and I commend them for thinking of us who need this. They put down the lines and the codes, which was such a help.

I love your magazine and wait by my mailbox every month for it to arrive. Thanks to all of you who slave over your desks to bring this fine magazine to your readers.

Dorothy J. Koniq
Perris, CA

See Page 142 of this issue for coverage of printer control code differences.

KUDOS

Editor:

T & D Subscription Software is to be commended for their prompt service and reliability. Most orders are received within 10 days instead of the usual four-to-six weeks. Anybody looking for great software and excellent service should patronize this company.

W.A. Queen III
Bessemer City, NC

Up and Running

Editor:

Just a note to tell you about the good people of Second City Software: Ed Hathaway and Dave Barnes. I met them at RAINBOWfest in Chicago and bought *CoCo Max III* from them, and a Disto Super Controller 2 from the Disto booth. The controller wouldn't work for me. (Disto had been recommended to me by Ed and Dave of Second City.) I tried to find the trouble — including changing the EPROM — to no avail.

Then I called Second City, and Ed had Dave Barnes *call me*. After about an hour and a half on the phone, we got the controller working with my 1.2 DOS. The jumpers and the book were wrong. Thanks to Ed and Dave, I am up and running now.

George L. Schneeweiss
Chicago, IL

Hard Drive Help

Editor:

First, I would like to thank Chris Burke of Burke & Burke for his help getting me going with my hard drive. It seems that OS-9 Level II is hard coded, so that whenever it sees `/H0` in the boot strap, it goes to the hard drive to finish booting. This is fine as long as you already have your hard drive formatted and the `CMDS` directory copied to it. If you have just gotten a hard drive, set it up as `/A0` until you get it formatted and `CMDS` copied, then you can change it back to the `/H0` and will have no problems.

Robert J. Grubb
Gallipolis, OH

A New Subscriber

Editor:

I have used CoCos for over 10 years. Today is the first day I have seen your magazine. Ladies and gentlemen, I am duly impressed. My masters degree is in computer science (specifically in software engineering), but believe me, if I knew anything beneficial to your company, I would be asking for a job in a second! Maybe I should get a second degree?

It's obvious you put a lot of effort into this product. I'm proud to be your next subscriber. Good work!

T. Riley
President, Riley Programming
Ames, IA

PEN PALS

- I am 11 years old and looking for a pen pal about my age, especially girls, but guys are welcome also. I have a CoCo 3, FD 502 disk drive, and other accessories. All letters are guaranteed to be answered.

Mike Miller
c/o Greg Miller
P.O. Box 55
Somersville, CT 06072

- I am 15 years old and would really like some pen pals. I have a CoCo 2 and 3, a CCR-82 cassette recorder, a disk drive, CGP-115 printer and a DMP-106 printer.

Sir Fred Patrick Hooper
Rt. 1, Box 370
Stonewall, TX 78571

- I am 11 years old and own a CoCo 2, disk drive, cassette recorder and OS-9. I would like to correspond with someone who knows about how to do things in Adventures, asking questions about them, or just talking about anything. I'll answer as many letters as I can, as soon as they get to me.

Andrew Yarrows
26 Briggs St.
Easthampton, MA 01027

- I am interested in amateur radio operators using the CoCo. I have a CoCo 1 and 2, MC-10, FD 502 disk drive and a DMP-130A printer. I would like to exchange ideas and other information about this hobby.

Gene Chambers
2221 Lovvorn Rd.
Carrollton, GA 30117

- I would like to get in touch with all European CoCo 3 users — we can't be the only ones with this beautiful machine out here. We could exchange the latest information and help each other.

Peter Tutelaers
Stryperstraak 50A
5595 GD Leende
The Netherlands

- I am a 15-year-old boy and have a CoCo 2 with one single-sided drive. I would like to have pen pals anywhere in the world, especially North America.

Carlos Augusto A.C. Junior
Rua Marques de Valenca
77 Casa 2
Rio de Janeiro-RJ-Brazil
CEP:20550

BULLETIN BOARD SYSTEMS

- The Kansas Konnection BBS is now up and running daily from 10 p.m. to 7 a.m. Central time. We are running a *CoBBS* system and feature CoCo downloads and uploads, message bases, want ads and more. Coming soon . . . *Galactic Conflict*! KK-BBS runs at 300/1200 baud. Please call the KK-BBS at (913) 738-5613.

Gary N. McCarty
215 E. 15th
Beloit, KS 67420

- The K-Board in Gloucester, Va., welcomes your call. It is a *CoBBS* system, online 24 hours. K-Board is a 300/1200 baud board using three single-sided drives and one RAM disk. Call (804) 693-6151.

William Keller
Rt. 1, Box 616
Gloucester, VA 23061

- The Tandy Terminal BBS is online 24 hours/7days at (314) 966-8653 for all your CoCo 2 and 3 needs. We are running at 8-bits and no parity. To get connected, press the spacebar. We are running at 300/1200/2400 baud on a 512K CoCo 3 with two double-sided drives. Online games such as *Galactic Conflict* are available to play, and there are a number of downloads changed weekly.

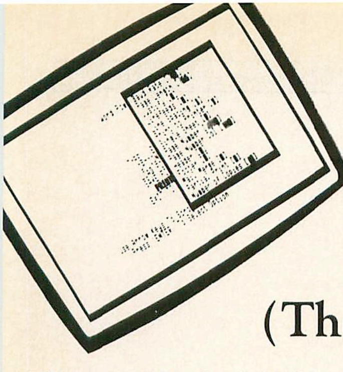
Thomas J. Wyrick
519 Meadow Creek Lane
St. Louis, MO 63122

- The Golden Kingdom RBBS has been up and running for nearly a year now. Although it is an *all* computer IBM system, I operate a CoCo conference (`J;COCO`) in the main menu. We have lots of public domain programs for downloads (pictures, games, utilities and OS-9) and a message base with bulletins. The number is (604) 562-1664. Supporting 3/12/24/9600 baud with no parity, 8-bits, 1 stop bit, 24 hours, 7 days a week.

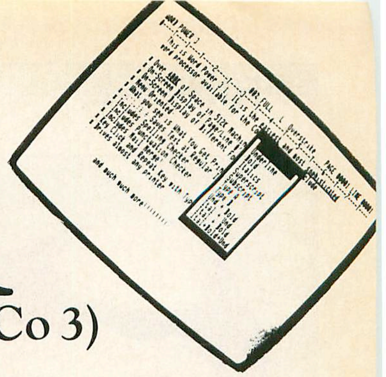
Ross Evans
P.O. Box 2981
Prince George, B.C.
Canada V2N 4T7

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.



Word Power 3.1



(The Ultimate Word Processor for the CoCo 3)

Power Unleashed! Unlike other word-processors, Word Power 3.1 is written from scratch for the CoCo 3. It bridges the gap between "what is" and "what should be" in word-processors. **No other word processor offers such a wide array of features that are so easy to learn and use.**

DISPLAY

The **80-column display** with true lowercase lets you view the full width of a standard page. **All prompts are displayed in plain English in neat colored windows (see display above).** The current column number, line number, page number and percentage of free memory is displayed on the screen at all times. The program even **displays the bottom margin perforation** so you know where one page ends and the other begins. You can also change foreground/background color of screen and select menu and carriage return colors to suit your needs! Carriage returns can be visible or invisible. Word Power 3.1 runs at double clock speed and can be used with RGB/composite/monochrome monitors as well as TV.

AVAILABLE MEMORY

No other word processor gives you so much memory. Word Power 3.1 gives you **over 72K** on a 128K machine and **over 450K** on a 512K machine to store text.

EDITING FEATURES

Word Power 3.1 has one of the **most powerful and user-friendly full-screen editors with word-wrap.** All you do is type. Word Power 3.1 takes care of the text arrangement. It even has a built-in **Auto-Save** feature which saves the current text to disk at regular intervals; so you know that your latest version is saved to disk. Here are some of the impressive editing features of Word Power 3.1:

Insert/Overstrike Mode (Cursor style changes to indicate mode); OOPS recall during delete; **Type-ahead buffer** for fast typers; Key-repeat (adjustable) and Key-click; Four-way cursor control and scrolling; Cursor to beginning of text, end of text, beginning of line, end of line, top/bottom of screen, next/previous word; Page up/down; Delete character, previous/next word, beginning/end of line, complete line, text before and after cursor; Locate/Replace with **wild-card search** with auto/manual replace; Block Mark, Unmark, Copy, Move and Delete; Line Positioning (Left/Center/Right); Set/Reset 120 programmable tab stops; Word count. Define left, right, top and bottom margins and page length. You can also highlight text (underline — with **on-screen underlining,** bold, italics, superscripts, etc). Word Power 3.1 even has a **HELP screen** which can be accessed any time during edit.

MAIL-MERGE

Ever try mailing out the same letter to 50 different people or sending out several resumes? Could be quite a chore. Not with Word Power 3.1. Using this feature, you can type a letter, follow it with a list of addresses and have Word Power 3.1 print out personalized letters. It's that easy!

SAVING/LOADING TEXT

Word Power 3.1 creates ASCII format files which are compatible with almost all terminal, spell-checking and other word-processing programs. It allows you to load, save, append and kill files and also to create and edit Basic, Pascal, C and Assembly files. You can select files by simply cursoring through the disk directory. Supports double-sided drives and various step rates.

PRINTING

Word Power 3.1 drives almost any printer (DMP series, EPSON, GEMINI, OKIDATA, etc). Allows print options such as baud rates, line spacing, page pause, partial print, page numbers, page number placement, linefeed option, multi-line headers/footers, right justification and number of copies (see display above). The values for these parameters and the margins can be changed anytime in the text by embedding Printer Option Codes. Word Power 3.1 has the **WHAT YOU SEE IS WHAT YOU GET** feature which allows you to preview the text on the screen as it will appear in print. You can see margins, page breaks, justification and more.

SPELLING CHECKER

Word Power 3.1 comes with a **20,000** word spelling checker/dictionary which finds and corrects mistakes within your text. You can add words to or delete from the dictionary or create a dictionary of your own.

PUNCTUATION CHECKER

This checker will **proofread your text for punctuation errors** such as capitalization, spaces after periods/commas, double words and much more. It's the perfect addition to any word processor.

DOCUMENTATION

Writing with Word Power 3.1 is a breeze. Word Power 3.1 comes with a well-written, easy-to-comprehend instruction manual which will lead you step-by-step through the program.

Word Power 3.1 comes on an UNPROTECTED disk and is compatible with RS DOS 1.0/1.1 and ADOS. Only $79.95.

(Word Power 3 owners can get the 3.1 version by sending proof of purchase and $10.00 to cover the cost of shipping and the manual.)

I purchased your Word Power. It arrived in time for my 13 year old daughter to process her history fair project. Word Power was easy to use and the features beat the heck out of the other word processors we were using.

KBG Tallahassee / Florida

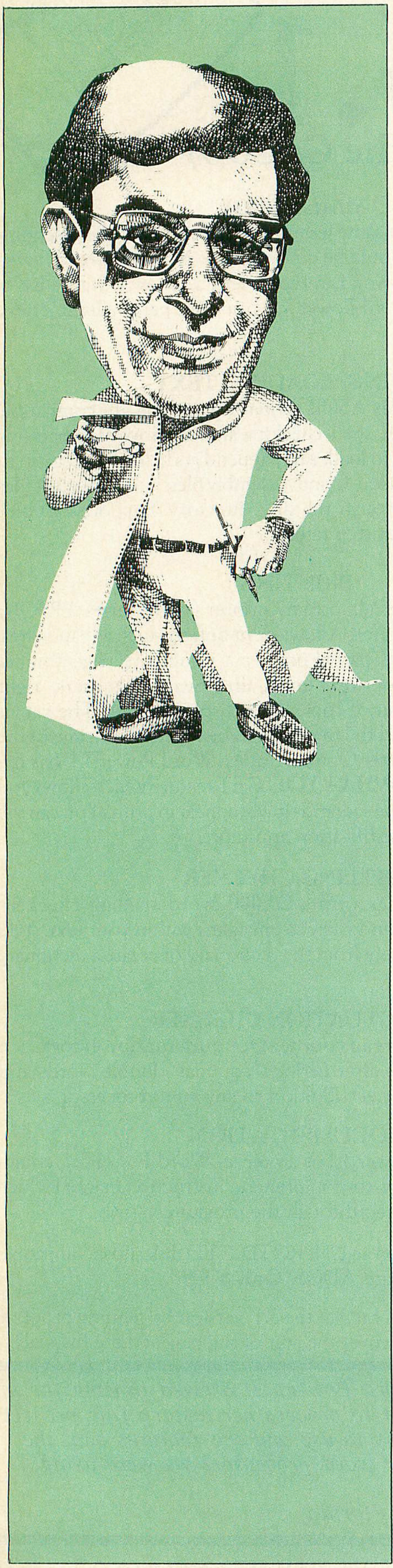
MICROCOM SOFTWARE
P.O. Box 214
Fairport, NY 14450
Phone (716) 223-1477

To Place Credit Card Orders Call Toll Free 1-800-654-5244 9 AM – 9 PM EST 7 days a week

NY, Canada, Foreign Orders, Information, Technical Advice and **Order Status** call 1-716-223-1477

All orders within Continental US shipped by UPS 2nd Day Air at no extra charge.

VISA, MC, AMEX, Check, MO. No CODs. Please add $3.00 S&H (USA & Canada), other countries $5.00 S&H. NYS residents please add sales tax.



Some Post-RAINBOWfest Reflections

One of the things I love about the Color Computer market is its innovation. That was evident at RAINBOWfest more than ever, and it keeps showing up as more and more people begin dipping into what is rightly considered the best home and small-business computer system in the world!

I'd like you to take just five minutes to page through this issue of THE RAINBOW. Maybe you will note, as I have, that a number of new start-up companies are coming into the CoCo arena. Yes, we sometimes bemoan the fact that some of the larger software houses do not write (or adapt) programs for the Color Computer (except when they sell directly to Tandy), but the truth of the matter is that it has never been the big companies which have made this market a success.

Over the past several months we have seen more and more smaller firms take a fling at the Color Computer market. According to an informal survey I conducted just the other day, they are very pleased with their results so far. This has always been the hallmark of the CoCo market — new and innovative products from people who are interested and care about their products and the people who buy them.

And, because of those people, there are always new mountains to climb, new areas to explore for all of us. We're really fortunate to be able to have a computer that attracts the kind of innovative people who make the CoCo a continuing source of discovery.

A number of the "old hands" are out there innovating, as well. I'm going to mention one of them here: Bill Vergona of Cer-Comp, simply because Bill's is an interesting story.

Bill has been in the Color Computer market longer than just about anyone. He's one of the finest technical types we have, and he's written some excellent software to do the kind of technical things that technical types love — looking at bits and bytes and the like.

COCO 3 UTILITIES GALORE

(All utilities support 40/80 columns for CoCo 3)
(CoCo 2 versions are available for most utilities)

SUPER TAPE/DISK TRANSFER

● Disk-to-Disk Copy (1-3 passes) ● Tape-to-Disk Copy ● Tape-to-Disk Automatic Relocate ● Disk-to-Tape Copy ● Tape-to-Tape Copy
Copies Basic/ML programs and DATA files. CoCo 1, 2 & 3. 32K Disk System (Disk to Disk Copy requires 64K). Disk Only **$24.95**

CoCo CHECKER

Something possibly wrong with your CoCo? CoCo Checker is the answer! Will test your ROMs, RAMs, Disk Drives & Controller, Printer, Keyboard, Cassette, Joysticks, Sound, PIAs, VDG, Internal Clock Speed, Multi-pak Interface and more! **$24.95**

DISK UTILITY 2.1A

A multi-featured tool for USER FRIENDLY disk handling. Utilize a directory window to selectively sort, move, rename & kill file entries. Lightning fast Disk I/O for format, copy & backup. Single execution of both Basic & ML programs. 64K DISK **$29.95** NOW also CoCo III compatible! Upgrade only **$15** w/proof of purchase.

COCO NEWSROOM

Now available for the CoCo III! You can design your own newspaper with Banner Headlines/6 articles using sophisticated Graphics, Fonts and Fill Patterns. Comes with 22 fonts & 50 pictures! Over 140K of code. Disk only **$49.95**

MAILLIST PRO

The ultimate mailing list program. Allows you to add, edit, view, delete, change, sort (by zipcode or name) and print labels. Its indispensible! Disk Only **$19.95** (CoCo 2 version included)

DISK LABEL MAKER

Allows you to design professional disk labels! Allows elongated, normal and condensed format for text, double-strike, border creation and multiple-label printing. Its a MUST for any user with a disk drive. Disk Only **$19.95.** Supports DMP 105/110/120/130/430, GEMINI, STAR, EPSON and compatibles. (CoCo 2 version included)

COMPUTERIZED CHECKBOOK

Why bother with balancing your checkbook? Let the CoCo do it for you! Allows you to add, view, search, edit, change, delete and printout (in a table or individual entry format) checkbook entries. Updates balance after each entry. Allows files for checking, saving and other accounts. Disk Only **$19.95** (CoCo 2 version included)

BOWLING SCORE KEEPER

An excellent utility to keep track of your bowling scores. Allows you to save scores under individuals or teams. You can edit, change, delete and compare scores. A must for anyone who wants to keep track of his or her bowling performance. Disk **$19.95** (CoCo 2 version included).

VCR TAPE ORGANIZER

Organize your videocassettes with this program! Allows you to index cassettes by title, rating, type, play time and comments. Also allows you to sort titles alphabetically and view/print selected tapes. If you own a VCR, this program is a must. Disk Only **$19.95** (CoCo 2 version included).

SCREEN DUMP

NEW

32, 40, 80 column text dump, PMODE 4 Graphics Dump. Single Keystroke Operation allows you to take snapshots of screens even when programs are running! Works on DMP's, Epson and Gemini. CoCo 1, 2 and 3. Disk Only **$24.95**

HOME BILL MANAGER

NEW

Let the CoCo keep track of your bills. Allows you to enter bills under various categories and reminds you when they are due. Disk Only. **$19.95**

CALENDAR MAKER

NEW

Generate monthly calendars on your printer for any year in the 20th century. Disk Only. **$19.95**

COCO UTIL II

(Latest Version): Transfer CoCo Disk files to IBM compatible computer. Transfer MS-DOS files to CoCo. Req. 2-Drive IBM compatible. **$39.95**

ADOS3

Advanced Disk Operating System for CoCo 3. **$34.95 ADOS $27.95**

SPIT'N IMAGE

Makes a BACKUP of ANY disk **$32.95**

RGB PATCH

Displays most games in color on RGB monitors. For CoCo 3 Disk. **$24.95**

OS 9 PRODUCTS

OS 9 LEVEL II OPERATING SYSTEM

NEW

Supports 512K RAM dual speed, multi-tasking, multiple windows and more! Comes with disk and complete documentation. Only **$89.95**

MULTI-VUE

User friendly graphics interface with multiple "window" applications for Level II. Only **$54.95**

WIZ

OS9 Level II Terminal Package with 300-19200 baud rate and windowing capability. Requires 512K and RS-232 Pack. Only **$79.95**

DYNASTAR

Best OS-9 Editor/Word Processor/Text Formatter. Has Keyboard Macros, supports terminals & windows simultaneously, configurable, auto-indent for C/Pascal programming, mail-merge. New manual makes it easier than ever. ONLY $149.95. DynSpell:$49.95
Both DynaStar & DynaSpell: Only $174.95

DYNACALC: OS-9

Excellent spreadsheet for OS-9 users. Only $99.95

PC-Xfer UTILITIES

NEW

Programs to format and transfer files to/from MS-DOS diskettes on CoCo Under OS9 Level 1 or 2. Requires SDISK or SDISK3. Only **$44.95**

SDISK 3

NEW

Standard disk drive module replacement allows full use of 40/80 track double sided drives. Req. OS9 Level II. Only **$29.95**

SDISK

NEW

Same as SDISK 3 except for OS9 Level I. Only **$29.95**

OS9 LEVEL II RAMDISK

Lightning Fast Ramdisk with Auto Formatting. A must for any OS9 Level II User. Req. 512K **$29.95.** (Only **$14.95** with purchase of 512K Upgrade & Ramdisk!!).

BOOKS

Inside OS9 Level II: $39.95
Rainbow Guide To OS9 Level II: $19.95
Rainbow Guide To OS9 Level II Disk: $19.95
OS9 is a trademark of Microware and Motorola, Inc.

MICROCOM SOFTWARE
P.O. Box 214
Fairport, N.Y. 14450
Phone (716) 223-1477

MasterCard VISA AMERICAN EXPRESS

All orders $50 and above shipped by UPS 2nd Day Air within Continental US at no extra charge. No CODs. We accept Visa, MC, Amex, Check or MO. Please add $3.00 S&H (USA/Canada). Other countries $5.00 S&H. NYS residents please add sales tax.

To Place Credit Card Orders, Call Toll Free 1-800-654-5244

NY, Canada, Foreign Orders, Information, Technical Advice and **Order Status** call **1-716-223-1477**

At RAINBOWfest Bill debuted a new offering, *Window Master*, which is quite a departure for him. Briefly, it is a windowing interface for the CoCo 3 that runs under the "regular" operating system, not OS-9.

I looked at it hurriedly while everyone, including Bill, was setting up. I try to stop by each booth at some point during the course of a show, but I had a hard time getting to Bill's at Chicago because there were lots and lots of people.

Bill seemed a little tired. Once the show was over, I found out why. Bill said he had literally been up for 36 hours beforehand, cleaning up the final code for *Window Master*. It ran smoothly at the show, of course, for Bill is a meticulous programmer. We talked about things late that Sunday, and I pointed out to Bill that *Window Master* was really his first "non-techie" program. He agreed.

As I write this, Bill is busy condensing his code to get the program to run in less than 512K. I am sure he will. And I am sure you will be interested in the product if you have a CoCo 3.

My only point to all this is that you find all sorts of surprises at RAINBOWfest and in the pages of THE RAINBOW. As I mentioned above, I am happy to see new players in the field, and I am also so very pleased to see others, like Bill Vergona, innovating and coming out with new products, new ideas and new concepts.

> ***"A number of new start-up companies are coming into the CoCo arena."***

It's what makes this Color Computer market so dynamic.

* * *

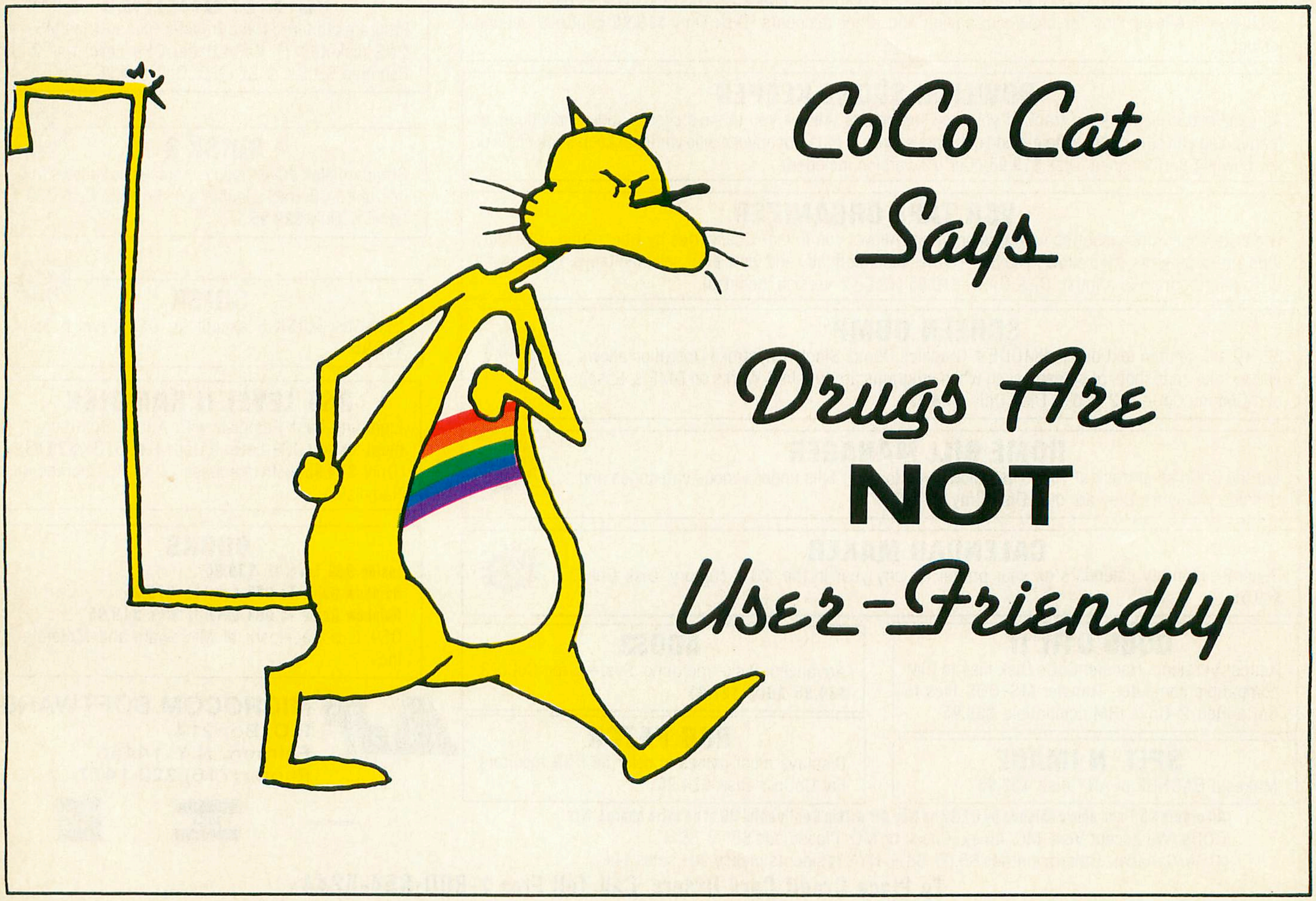
You may have noticed a difference when you got this month's issue of THE RAINBOW. We've gone from the paper wrapper we have been using to protect your favorite computer magazine in the mail, to a polybag. The polybag is tougher and allows us to place what are known as "outserts" in the magazine as well.

An "outsert," which I guess is the opposite of an "insert," lets us include things inside the polybag without having to go to the expense of binding it inside the magazine itself.

One of the changes is that you'll be getting an "outsert" notice when your subscription is about to run out rather than the notice printed on the paper wrapper. Another is that — we hope — some of our advertisers will be able to take advantage of the polybag and its "outserting" capability to include catalogs and the like inside the bag. It makes it easier for us to handle and less expensive for the advertiser to produce.

Finally, you may have noticed your favorite computer magazine "on the rack" at Waldenbooks, Cole's Books and several other locations. We've always been carried by a great number of Waldenbooks' stores, but now we will be in 1,100 of them nationwide. Not only will THE RAINBOW be in the stores, but we'll be on a special rack designed especially for computer magazines. Go by and see!

— Lonnie Falk



500 POKEs, PEEKs, 'N EXECs

FOR THE TRS-80 COCO

NEVER BEFORE has this information of vital significance to a programmer been so readily available to everyone. This book will help you 'GET UNDERNEATH THE COVER' of the Color Computer and develop your own HI-QUALITY Basic and ML programs. SO WHY WAIT??

This 80-page book includes POKEs, PEEKs and EXECs to:

- ★ **Autostart your basic programs**
- ★ **Disable** Color Basic/ECB/Disk Basic commands like LIST, LLIST, POKE, EXEC, CSAVE(M), DEL, EDIT, TRON, TROFF, PCLEAR, DLOAD, RENUM, PRINT USING, DIR, KILL, SAVE, LOAD, MERGE, RENAME, DSKINI, BACKUP, DSKI$, and DSKO$.
- ★ **Disable** BREAK KEY, CLEAR KEY and RESET BUTTON.
- ★ **Generate** a Repeat-key.
- ★ **Transfer** ROMPAKS to tape (For 64K only).
- ★ **Set** 23 different GRAPHIC/SEMIGRAPHIC modes
- ★ **Merge** two Basic programs.
- ★ **AND MUCH MUCH MORE!!!**

COMMANDS COMPATIBLE WITH 16K/32K/64K/COLOR BASIC/ECB/DISK BASIC SYSTEMS and CoCo 1, 2, & 3.

ONLY $16.95

SUPPLEMENT to 500 POKES, PEEKS 'N EXECS

ONLY **$9.95**

200 additional Pokes, Peeks 'n Execs to give you MORE PROGRAMMING POWER. Includes commands for:

- **Rompak Transfer to disk**
- **PAINT with 65000 styles!**
- **Use of 40 track single/double sided drives with variable step-rates**
- **High-Speed Cassette Operation**
- **Telewriter 64®, Edtasm+® and CoCo Max® Enhancements**
- **Graphics Dump (for DMP printers) & Text Screen Dump**
- **AND MUCH MUCH MORE!**
- **500 POKES, PEEKS 'N EXECS is a prerequisite**

300 POKES PEEKS 'N EXECS FOR THE COCO III

Get more POWER for your CoCo III. Includes commands for:

300
POKES
PEEKS 'N EXECS
FOR THE COCO III
Kishore M. Santwani

- **40/80 Column Screen Text Dump**
- **Save Text/Graphics Screens to Disk**
- **Command/Function Disables**
- **Enhancements for CoCo 3 Basic**
- **128K/512K Ram Test Program**
- **HPRINT Character Modifier**
- **AND MANY MORE COMMANDS** ONLY **$19.95**

"MUST" BOOKS

UNRAVELLED SERIES: These books provide a complete annotated listing of the BASIC/ECB and DISK ROMs.

EXTENDED COLOR BASIC UNRAVELLED: $39.95
DISK BASIC UNRAVELLED: $19.95
BOTH UNRAVELLED BOOKS: $49.95
SUPER ECB (CoCo3) UNRAVELLED: $24.95 NEW
ALL 3 UNRAVELLED BOOKS: $59.95
COCO 3 SERVICE MANUAL $39.95
COCO 2 SERVICE MANUAL: $29.95
INSIDE OS9 LEVEL II $39.95
RAINBOW GUIDE TO OS9 LEVEL II ON COCO 3: $19.95
RAINBOW GUIDE TO OS9 II DISK: $19.95
BASIC PROGRAMMING TRICKS $12.95
COCO 3 SECRETS REVEALED: $19.95
ASSEMBLY LANGUAGE PROGRAMMING*: $18.00
ADDENDUM FOR COCO 3: $12.00
UTILITY ROUTINES VOL 1 BOOK: $19.95

GAMES (Disk Only) (CoCo 1, 2, & 3 except where mentioned)

WILD WEST (CoCo 3 Only) **$24.95**
VEGAS SLOTS (CoCo 3 Only) **$29.95**
VEGAS GAME PACK: $24.95
FLIGHT 16: $34.95
IN QUEST OF STAR LORD
(Animated Graphics Adventure CoCo 3): **$34.95**
WHITE FIRE OF ETERNITY: $19.95

PYRAMIX (Cubix for CoCo 3): **$24.95**
P-51 MUSTANG SIMULATION: $34.95

WORLDS OF FLIGHT: $34.95
KUNG FU DUDE: $24.95
APPROACH CONTROL SIMULATION: $34.95
TREASURY PACK #1: Lunar Rover Patrol, Cubix, Declathon, Qix, Keys of Wizard, Module Man, Pengon, Space Wrek and Roller Controller. Only **$29.95**
TREASURY PACK #2: Lancer, Ms. Gobbler, Froggie, Madness and Minotaur, Ice Castles, Galagon, Devious and Syzygy. Only **$29.95**
SPACE PACK: Color Zap, Invaders, Planet Invasion, Space Race, Space War, Galax Attax, Anaroid Attack, Whirlybird, Space Sentry & Storm Arrows. Only **$29.95**

COCO GRAPHICS DESIGNER

Signs Greeting Cards Banners

The CoCo Graphics Designer allows you to create beautifully designed Greeting Cards, Signs and Banners for holidays, birthdays, parties, anniversaries and other occasions. Comes with a library of pre-drawn pictures. Also includes utilities which allow you to create your own character sets, borders and graphic pictures. Requires a TRS-80 COLOR COMPUTER I, II OR III OR TDP-100 with a MINIMUM OF 32K, ONE DISK DRIVE and a PRINTER. compatible with DISK BASIC 1.0/1.1, ADOS 1.0/1.1 AND JDOS. Supports the following printers: DMP 100/105/110/130/430, CGP 220, EPSON RX/FX, GEMINI 10X, SG-10, NX-10 & OKIDATA. DISK **$29.95**

PICTURE DISK #1: 100 more pictures for CGD: **$14.95**
FONT DISK #1: 10 extra fonts! **$19.95**
FONT DISK #2: 10+ extra fonts **$19.95**

CAR SIGN DESIGNER

Create distinctive bright yellow diamond shaped car signs. Includes 2 resuable clear plastic sign holders with suction cups, and 50 sheets of bright yellow fanfold paper.
Disk Only **$29.95**

COLORED PAPER PACKS $24.95

COCO MAX III (with hi-res interface): **$79.95**
COCO MAX II: Disk **$77.95** Tape **$67.95**
MAX PATCH An excellent software patch to run COCO MAX II on COCO III. Req. RS Hi-res Joystick Interface. No chip replacements or soldering. Disk only **$24.95**
COLOR MAX 3 DELUXE: $69.95
COLOR MAX 3: $59.95

Telewriter-64: Best Word Processor for CoCo 1 & 2 (Cas) **$47.95** (Disk) **$57.95**
TW-80: 80 Column Display & more features for TW-64. CoCo 3 Disk **$39.95**
TELEFORM: Mail Merge & Form Letters for TW-64. **$19.95**
Autoterm: Superb Terminal Program. Works with any modem! (Cas) **$29.95** (Disk) **$39.95**
Pro Color File *Enhanced*: Multi-feature Database. **$59.95** **Sidewise: $24.95**
Pro-Color Dir: $24.95
EDT/ASM 64 D: Best Disk Based Editor-Assembler for CoCo. **$59.95** (Specify CoCo 1, 2 or 3)
THE SOURCE: Best Disassembler for CoCo **$34.95**
THE SOURCE III: $49.95
CBASIC: Most powerful Basic Program Complier **$149.95** (Specify CoCo 1, 2 or 3)
DYNACALC (COCO 1, 2 & 3): **$99.95**

MICROCOM SOFTWARE
P.O. Box 214
Fairport, N.Y. 14450
Phone (716) 223-1477

All orders $50 and above shipped by UPS 2nd Day Air within Continental US at no extra charge. No CODs. We accept Visa, MC, Amex, Check or MO. Please add $3.00 S&H (USA/Canada). Other countries $5.00 S&H. NYS residents please add sales tax.

VISA MasterCard AMERICAN EXPRESS Card

To Place Credit Card Orders, Call Toll Free 1-800-654-5244 9 AM – 9 PM EST 7 days a week
NY, Canada, Foreign Orders, Information, Technical Advice and **Order Status** call **1-716-223-1477**

How To Read Rainbow

When we use the term CoCo, we refer to an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

The BASIC program listings printed in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service.

Using Machine Language

The easiest way to "put" a machine language program into memory is to use an editor/assembler, a program you can purchase from a number of sources. All you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of putting an ML listing into CoCo is called "hand assembly" — assembly by hand, which *sometimes* causes problems with `ORIGIN` or `EQUATE` statements. You ought to know something about assembly to try this.

Use the following program if you want to hand-assemble ML listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I, VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the `&H3F00` in Line 10 to `&H7F00` and change the value of `I` to `&H7F80`.

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: `CMDS` and `SOURCE`. It also contains a file, `read.me.first`, which explains the division of the two directories. The `CMDS` directory contains executable programs and the `SOURCE` directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the `SOURCE` directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

1) Type `load dir list copy` and press ENTER.
2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the sytem master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
3) List the `read.me.first` file to the screen by typing `list read.me.first` and pressing ENTER.
4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the `CMDS` directory, enter `dir cmds`. Follow a similar method to see what source files are in the `SOURCE` directory.
5) When you find a program you want to use, copy it to the `CMDS` directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/`*filename*`/d0/cmds/`*filename*` -s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/`*filename*`/d0/cmds/`*filename*

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal

RAINBOW
CERTIFICATION
SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification.

The Seal is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Rainbow Check Plus

The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command `RUN` and press ENTER. Once the program has run, type `NEW` and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

SUPER 88 UTILITIES For Only $88

$440 Value!

40K FOR CASSETTE PROGRAMS: #200
40K FOR DISK BASIC PROGRAMS: #201
ALPHA-DIR:Alphabetize DIR's #202
APPOINTMENT CALENDAR: #203
ASCII FILE UTILITY: #204
AUTOMATIC DISK BACK-UP:Req. 2 drives #205
AUTOMATIC 5 MIN. CASSETTE SAVE: #206
AUTOMATIC 5 MIN. DISK SAVE: #207
AUTO DIR BACK-UP:No more FS errors #208
BASE CONVERTER:#209
BANNER MAKER:7" high letters #210
BASIC SEARCH:Search for a string #211
BORDER MAKER:255 border styles #212
CASSETTE LABEL MAKER:DMP's only #213
CLOCK:Keeps time as you program #214
COMMAND KEYS:Shorthand for BASIC #215
COMMAND MAKER:Design own commands #216
COMMAND SAVER:Saves/recalls commands #217
CALCULATOR:On-screen calculator #218
CURSOR STYLES:65535 cursor styles #219
DISK CATALOGER:DIR's into master DIR #220
DISK ENCRYPT:BASIC password protection #221
DMP CHARACTER SET EDITOR:#222
DMP SUPERSCRIPTS:Great for term papers #223
DOS COMMAND ENHANCER:#224
DOUBLE BANK:64K only #225
ENHANCED KILL:#226
ENHANCED LLIST:Beautiful LLISTings #227
ENHANCED TRON: #228
ERROR LOCATOR: #229
E-Z DISK MASTER: #230
FAST SORT:100 strings in 3 seconds #231
FILE SCRAMBLER:Hide your private files #232
FULL ERRORS: English error messages #233
FUNCTION KEYS:Speeds prog time #234
GRADE BOOK:Great for teachers #235
GRAPHICS SCREEN COMPRESSION: #236
GRAPHICS SHIFTER: #237
GRAPHICS TYPE SETTING:2 letter sizes #238
GRAPHICS ZOOM:Magnify/edit graphics #239
INPUT/OUTPUT DATA MONITOR: #240
KEY CLICKER:Ensures input accuracy #241
KEY SAVER:Save/recall keystrokes #242
LAST COMMAND REPEATER: #243
LINE COPY:Copy BASIC lines #244
LINE CROSS-REFERENCE: #245
LIST/DIR PAUSE:No more fly-bys #246
LOWER CASE COMMANDS: #247
MASS DISK INITIALIZATION: #248
MESSAGE ANIMATOR:Great billboard #249
METRIC CONVERSION: #250
ML/BASIC PROGRAM MERGE: #251
ML TO DATA CONVERTER: #252
MULTIPLE CHOICE TEST MAKER: #253
NUMERIC KEYPAD: #254
ON BREAK GOTO COMMAND: #255
ON ERROR GOTO COMMAND: #256
ON RESET GOTO COMMAND: #257
PHONE DIRECTORY: #258
PAUSE CONTROL:Put progs on hold #259
PRINTER TO SCREEN: #260
PRINTER TUTORIAL: #261
PROGRAM PACKER:For BASIC progs #262
PURCHASE ORDER MAKER: #263
RAMDISK:In-memory disk drive #264
REPLACE/FIND STRINGS: #265
REVERSE VIDEO (GREEN): #266
REVERSE VIDEO (RED): #267
RAM TEST:Checks your RAM #268
ROM SWITCHER: #269
SIGN MAKER:Runs on any DMP #270
SINGLE STEPPER:Great de-bugger #271
SPEEDUP TUTORIAL: #272
SPOOLER:Speed up printouts #273
SUPER INPUT/LINE INPUT: #274
SUPER COMMAND KEYS: #275
SUPER COPY:Copy multiple files #276
SUPER EDITOR:Scroll BASIC progs #277
SUPER PAINT:65535 patterns #278
SUPER REPEAT:Repeat key #279
SUPER SCROLLER:View scrolled lines #280
TAB/SHIFT LOCK KEYS: #281
TAPE ENCRYPT:Password protect BASIC #282
TAPE INDEX SYSTEM:For tape progs #283
TEXT SCREEN SCROLL LOCK: #284
TITLE SCREEN CREATOR: #285
UNKILL:Recover KILLed disk progs #286
VARIABLE CROSS-REFERENCE: #287

All Above Utilities Only $88, or 1 Program $9, 2 Programs $16, 3 Programs $21,. 4 Programs $24, 5 or more at $5 each. All Programs on disk. More than 1 pro. on same disk. Documentation Included.

COLOR SCHEMATIC DESIGNER

By Prakash Mishra

An Excellent CACD Software Package for CoCo 3. Features:

- **Runs in 640x192 at 1.8Mhz**
- **Pull Down Menus**
- **Keyboard/Joystk/Mouse Support**
- **RGB/Comp/Monochrome Monitors**
- **72 Modifiable Symbols**
- **Multiple Hi-Res Fonts**
- **Multiple UNDO Command**
- **Symbol Rotate/Line/Box Draw**
- **Supports 3 layers of circuits**
- **Complete Window Scrolling**
- **Powerful Screen Print Command**
- **Complete Documentation**

Disk Only $39.95

NEW

WINDOW MASTER

The hottest program for your 512K CoCo 3!! Imagine using Windows, Pull Down Menus, Buttons, Icons, Edit Fields and Mouse Functions in your Basic Programs. No need to use OS9. It uses the 640x255 (or 320x255) hires graphics mode for the highest resolution. Up to 31 windows can appear on the screen at one time. Need extra character sets? Window Master supports 5 fonts in 54 sizes!! How about an enhanced editor for Basic.? I gives you a superb Basic Editor which leaves the standard EDIT command in the cold. And don't forget that many existing Basic/ML programs will run under Window Master with little or no changes. In fact it does NOT take up any memory from Basic. Window Master has so many features that will fill 2 pages!! Don't MISS OUT on this one! Req. min 512K, 1 Disk Drive, RS Hi-Res Interface & Joystick or Mouse. Only $69.95. Window Master & Hi-Res Interface: $79.95.

StarScan

by J.D. Walker

NEW

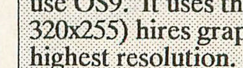
Dumps a HSCREEN2 screen to a NX-1000 Rainbow printer in 64 colors!! Only $19.95

NX 1000 Rainbow System

- Star NX1000 Color Printer
- Serial to Parallel Interface
- Free Software: StarScan & Signs 'N Banners

Only $299

(Include $10 Shipping; Amex 3% extra)



MICROCOM SOFTWARE
P.O. Box 214
Fairport, N.Y. 14450
Phone (716) 223-1477

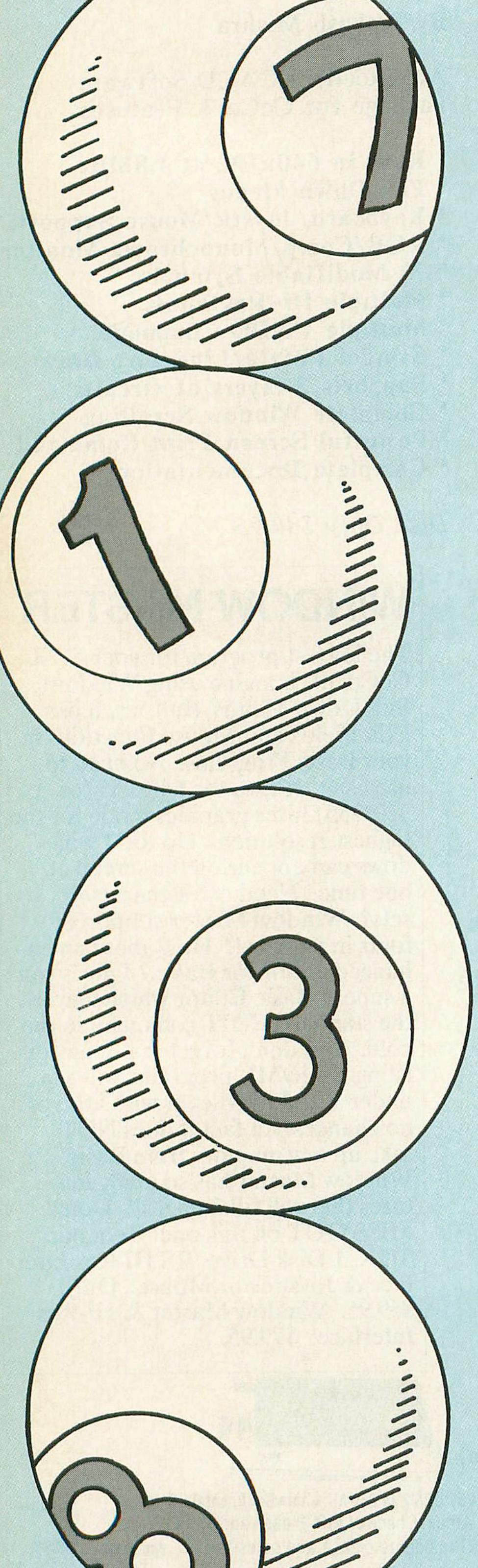
All orders $50 and above (except Disk Drives) shipped by UPS 2 nd Day Air within Continental US at no extra charge. No CODs. We accept Visa, MC, Amex, Check or MO. Please add $3.00 S&H (USA/Canada). Other countries $5.00 S&H. NYS residents please add sales tax

No Free 2nd day shipping for Printer.

MasterCard VISA

To Place Credit Card Orders, Call Toll Free 1-800-654-5244 9 AM – 9 PM EST 7 days a week

NY, Canada, Foreign Orders, Information, Technical Advice and **Order Status** call **1-716-223-1477**



Solution to last month's logic problem

The Crazy Pool Ball Explained

By Bruce W. Ronald

The problem in last month's RAINBOW was to identify which of 12 pool balls was heavier or lighter than the others. You had only three weighings on a simple balance scale, which only tells if one side is heavier than the other, to solve the problem. The program also provided you with a way to test your algorithm.

One insight into the problem is that the most you can handle on the final weighing is three, and you must know each ball's proclivity. That is, if you weigh the first six balls on the left side of the scale against the second six on the right, and the left side of the scale goes down, you know that balls 1 through 6 have a proclivity to be heavy and 7 through 12 a proclivity to be light. If you end up with three suspects, all with a heavy proclivity, you can weigh one against the other — for instance, Ball 1 versus 2. If Ball 1 goes down, it's 'X'; the same goes for Ball 2. If the scales balance, X is Ball 3.

You soon learn that the first weighing, however, must be four balls against four; no other comparison yields so much information and elimination. Weigh balls 1, 2, 3 and 4 against 5, 6, 7 and 8. If the scale balances, the solution is fairly easy. You next weigh balls 9 and 10 against 11 and Y (any ball from the first eight that you know to be normal).

If this scale balances, Ball 12 is the deviant; weighing Ball 12 against Y determines if it is lighter or heavier. If balls 9 and 10 go down, it can only be because either 9 or 10 are heavier, or 11 is lighter; weigh 9 against 10 to finish the answer. If Ball 9 goes down, it is the "crazy" ball. Ditto for Ball 10. If this weighing balances, Ball 11 is light.

If the original weighing does not balance, we have a trickier problem. If group 1 through 4 goes down, we know that 1, 2, 3 or 4 could be heavy; or 5, 6, 7 or 8 could be light; or vice versa if group 1 through 4 goes up.

In this case the next weighing is balls 1, 2 and 5 against 3, 6 and Y. If group 1, 2, 5 drops, it can only be because 1 or 2 is heavy or 6 is light; a 1 versus 2 weighing produces the answer. If group 3, 6, Y drops, the crazy ball can only be Ball 5 (light) or Ball 3 (heavy). A weighing of one against Y produces the answer. If 1, 2, 5 and 3, 6, Y are equal, weigh Ball 7 against Ball 8. The lighter ball is the deviant. If 7 and 8 balance, the only possibility remaining is a heavy Ball 4.

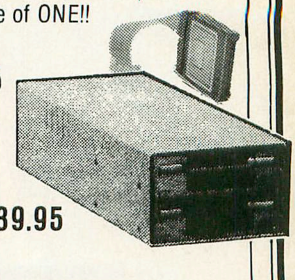
Whoever dreamed up this problem originally was an evil genius! I hate to admit how many hours I spent before spotting the concept of proclivity and, finally, the trick of crossing the balls on the middle weighing. I hope you were much faster and that the program helped you prove the validity of your answer.

(Questions or comments concerning this solution may be addressed to the author at 101 Forrer Blvd., Dayton, OH 45419. Please enclose an SASE when requesting a reply.)

Bruce Ronald, an advertising copywriter, holds a bachelor's degree in speech. He has written a science fiction thriller, Our Man in Space, *and the book of the musical,* Dracula, Baby. *He and his wife, Virginia, coauthored two prize-winning local histories of Dayton and its suburb, Oakwood — the latter on the CoCo.*

DISK DRIVES

Double Sided Double Density 360 K 40 Track ½ Ht Disk Drives for CoCo 2 and 3. Buy from someone else and all you get is a disk drive. Buy from us and not only do you get a quality disk drive but also $60 worth of disk utility software (Super Tape/Disk Transfer and Disk Tutorial) and our DISKMAX utility which allows you to use BOTH sides of our disk drives. Its like buying TWO disk drives for the price of ONE!!



Drive 0 (with J & M Controller & Cable): **$229.95 Drive 1: $149.00**

TWO ½ ht Drives in one case with cable & controller: $339.95

Single Power-Supply & Case: $59.95 **Disk Drive Power Supply 'Y' Cables: $8.95**

(90 day warranty on all drives)

J&M Controller (with RSDOS): **$79.95 DISTO Super Controller: $99.95**

Mini Eprom Programmer Add-On: $54.95 Real Time Clock & Parallel Printer Interface Add-on: $39.95

DISTO Super Controller II: $129.95

1 Drive Cable: $19.95 **2 Drive Cable: $24.95** **4 Drive Cable: $39.95**

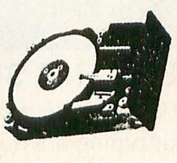
HARD DRIVE KITS

Complete with Hard Drive, WD Controller Burke Interface, Cables,. Case, Power Supply, Software (OS9 & Basic) and complete instruction manual.

20 Meg Kit: $529

30 Meg Kit: $549

Assembled/Tested/Formatted: $30 extra



Pl. add $10 S&H for drives in US/Canada

HARD DRIVE INTERFACES

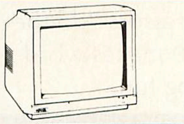
COCO XT: Use 5-120 meg drives with CoCo $69.,95. With Real Time Clock: $99.95

HYPER IO: Allows Hard Drives use with RS-DOS. Only $29.95

COCO XT ROM: Boots OS9 from Hard/Floppy Drives. Only $19.95

(Multipak required for the hard drive use)

MONOCHROME MAGNAVOX **MONITOR $99 (Cable Extra)**



8CM515 RGB Monitor 80
17% larger screen than standard 12″ monitors. RGB TTL, RGB Analog, Composite inputs. Green raster display switch. Etched faceplate. ONLY **$294.00** Include $12 shipping. FREE Magnavox cable for COCO 3 with the purchase of the monitor.

COMMUNICATIONS EXTRAVAGANZA

1) **AVATEX 1200e MODEM:** Fully Hayes compatible 300/1200 Baud, Auto-Dial/Answer/Redial (Reg. $129.95)
2) **MODEM CABLE** (Reg. $19.95)
3) **AUTOTERM TERMINAL SOFTWARE**
4) **FREE COMPUSERVE OFFER and Access Time**
5) **UPS 2nd DAY AIR Shipping.**

ONLY $149.95

(With AVATEX 1200hc instead of AVATEX 1200: $174.95)

AVATEX 2400: **$229.95**

The Avatex 1200

UPGRADES

512K UPGRADE FOR COCO III

Fast 120ns chips. Fully tested. Easy installation. No soldering. Comes with complete documentation and RAM test program on disk.

ONLY $CALL

(With purchase of our 512K RAMDISK program below)

512K Upgrade without chips $44.95

512K RAMDISK $24.95

Have 2 superfast RAMDISKs & a print spooler.

64K Upgrade for 26-3134A/B CoCo II:$39.95

64K Upgrade for CoCo I's, CoCo II's with Cat #26-3026/7, 26-3134 & 26-3136: $29.95

CABLES/INTERFACE

RS232 Y CABLE: Hook 2 devices to the serial port. ONLY **$18.95**

Y CABLE: Use your Disk System with CoCo Max, DS69, etc. ONLY **$24.95**

15' PRINTER/MODEM EXTENDER CABLE: ONLY **$16.95**

MODEM CABLE: 4 pin to DB 25: **$19.95**

15" MULTIPAK/ROMPAK EXTENDER CABLE: $29.95

3-POSITION SWITCHER: $37.95

WICO TRACK BALL: $34.95

RS HI-RES JOYSTICK INTERFACE: $11.99

MAGNAVOX 8505/8515/8CM643 Analog RGB Cable: $24.95

CM-8 RGB Analog Ext. Cable: $19.95

SONY Monitor Cable: $39.95

VIDEO DRIVER: For Monochrome or Color. Specify CoCo 1 or 2. **$34.95**

VIDEO CLEAR: Reduce TV interference. **$19.95**

SERIAL TO PARALLEL INTERFACE: With 6 switch selectable baud rates (300-9600) Comes with all cables. **$44.95**

EPROM

INTRONICS EPROM PROGRAMMER: Best EPROM Programmer for the CoCo. Lowest Price Anywhere. **$137.95**

EPROM ERASER (Datarase): Fast erase of 24/28 pin EPROMs. **$49.95**

EPROMS: 2764 – **$8.00**, 27128 – **$9.00** Call for other *EPROMs.*

BOTH EPROM PROGRAMMER and ERASER: $179.95

ROMPAK w/Blank PC Board 27xx Series: $12.95

KEYBOARDS/ACCESSORIES

KEYBOARD EXTENSION CABLE: Our keyboard extender cable allows you to move your keyboard away from the computer and type with ease. You can use your existing keyboard with this cable or leave your present keyboard intact and use a second keyboard. A MUST for all CoCo Users. Only **$39.95.** Cable with CoCo II keyboard: **$49.95** **COCO 3 KEYBOARD** (includes FREE FUNCTION KEYS software value $19.95) **$39.95** CoCo II keyboard: **$19.95**

CHIPS, ETC.

Disk Basic Rom 1.1 (Needed for CoCo III) **$29.95. 68B09E Chip: $14.95 ECB Rom 1.1: $29.95. Multi-Pak PAL Chip** for CoCo 3 **$19.95 PAL Switcher:** Now you can switch between the CoCo II and CoCo III modes when using the Multi-Pak. You need the OLDER and NEW PAL chip for the 26-3024 Multipak. Only **$39.95** With NEW PAL Chip **$49.95** **5¼" DS/DD Disks: $0.45 each.**

MICROCOM SOFTWARE
P.O. Box 214
Fairport, N.Y. 14450
Phone (716) 223-1477

All orders $50 and above (except Disk Drives) shipped by UPS 2nd Day Air within Continental US at no extra charge. No CODs. We accept Visa, MC, Amex, Check or MO. Please add $3.00 S&H (USA/Canada). Other countries $5.00 S&H. NYS residents please add sales tax.

No Free 2nd Day Shipping for Monitors.

To Place Credit Card Orders, Call Toll Free 1-800-654-5244 9 AM – 9 PM EST 7 days a week

NY, Canada, Foreign Orders, Information, Technical Advice and **Order Status** call **1-716-223-1477**

Max-10™

COLORWARE

BLINDING SPEED

Max-10 is entirely written in machine language. Its speed will amaze you.

SLEEK

A lot of word processors "do the job", but Max-10 makes word processing fun.

INTUITIVE

Max-10 is so well designed you can use it without reading the manual.

FUN

Max-10 is actually fun to use, which is quite an achievement for a word processor.

FORMAT

Unlimited choice of right or left alignment, centering, and line spacing. Screen is updated immediately to show exact effects of changes.

PAGE NUMBERING

On-screen page number helps you find your place.

SUPERB FILE SUPPORT

Max-10 menus let you load files without typing anything: simply point and click.

FILE COMPATIBILITY

Max-10 can import files from your outmoded word processor.

GRAPHICS

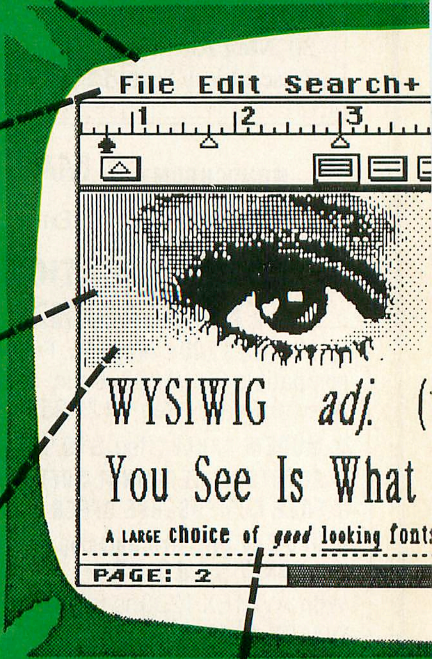
Mix text and graphics on your page. Pictures can be created by CoCo Max, the DS-69 Digitizer, or any graphics editor.

FIT IT IN

Pictures can be shrunk and stretched in both directions to fit the page and text.

TAB STOPS & MARGINS

The rulers make tabs and margins easy to see, use, and change.



CUT AND PASTE

Move anything (even graphics) anywhere in the document.

Max-10 Specifications: variable line length; right, left, top and bottom margins; word wrap; undo; page numbering; set starting page; left and right justification; centering; margins and centering can be changed anywhere in the document; variable line spacing; programmable headers and footers (with centering, graphics, etc.); type ahead; key repeat; key click; scroll up and down; jump to any point in document; ASCII file ouput for compatibility; disk directory; kill files; bold, italic, underline, superscript and subscript type styles; wordwrap; block cut, copy, move; global search and replace; paragraph indent; clipboard; merge; show file (on disk); free memory display, page count, paragraph count, word count; graphics can be resized and moved; multiple fonts; error recovery and more!

PRINTERS

Max-10 currently works with the following printers: DMP-105, DMP-106, DMP-130, Epson MX,RX,FX,LX and compatible, Gemini 10 series, CGP-220, and OKI-92.

BY DAVE STAMPE

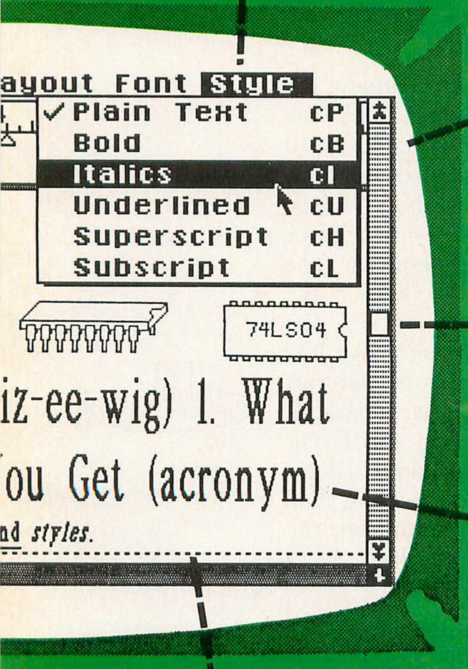
Author of CoCo Max III, the best and most acclaimed CoCo 3 Graphics Editor.

GRAPHICS

Max-10 can import pictures stored in the following formats: CoCo Max I,II,III, MGE, MGF, 5 level DS-69, as well as any standard PMODE 4, HSCREEN 2 or 3 picture.

THE DAZZLING WORD PROCESSOR
AND DOCUMENT CREATOR FOR THE COCO 3

PULL DOWN MENUS
All Max-10 Functions can be easily accessed through the six pull-down menus. There are no commands to learn.



PAGE BREAK
Dotted lines on the screen show where pages begin and end. No more surprises at printing time.

FULL JUSTIFICATION
Proportionally spaced characters let you create text that looks really nice. No more squished "M"s and oversized "I"s.

SYSTEM REQUIREMENTS
Any CoCo 3 (128K or 512K) with at least 1 Disk Drive.
Mouse or joystick.
Monochrome, RGB or Composite monitor.

WYSIWYG!
What You See Is What You Get. Max-10 is the only CoCo word processor with graphics where the printout looks exactly like the screen (Macintosh style).

UNDO
The undo feature lets you change your mind even AFTER you make a drastic change, such as a "block delete".

SCROLL BOX
Point and click for lightning fast access to any point in the entire document.

MORE FONTS
Max-10 features 20 different fonts (styles and sizes). It goes well beyond your printer's built in character sets.

TOTAL CONTROL
Any number of available character styles and sizes can be mixed on the same line.

HEADERS & FOOTERS
These are super easy to add and edit. They can even include graphics and pictures!

COLORWARE
A division of Sigma Industries, Inc.

Why Max-10?
Most of you already have an "adequate" word processor, so why did we spend considerable time and effort to create **Max-10**?

Because you asked for it. **CoCo Max** made graphic creation fun. It is fast and feature loaded, yet amazingly easy to use. You wanted your word processor to be as friendly, forgiving, and amazing as **CoCo Max**. We couldn't do it on the CoCo 1 or 2, but with the advanced CoCo 3 graphics, the word processor you always wanted is here: **Max-10**

Max-10 is not just a word processor. It gives you letter styles and sizes that your printer doesn't have. It lets you mix graphics and pictures in your text for a professional looking output.

Additionally, the screen shows exactly what your output will look like. Text is in the size and style that it will print. Page breaks, line length and spacing are clearly shown. No more hoping that the text will fit, no more guessing at type styles, no more messing with printer codes, no more cryptic commands to memorize, and best of all, the undo feature lets you make a mistake and still recover your text.

Max-10 makes typing easy, and you'll love the new things you can do with the best word processor ever created for the CoCo.

PRICE: $79.95

CoCo Max III OWNERS
If you already own CoCo Max III, deduct $10 from your order.

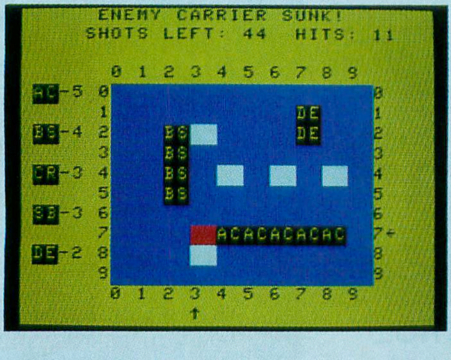
TO ORDER
Call (203) 656-1806 9 to 5 Eastern time
Visa or Mastercard accepted. C.O.D orders $3 extra
Send check or M.O. to: Colorware, 242-W West Ave, Darien CT 06820
Add $3 per order for shipping ($5 to Canada, 10% to overseas).
CT residents add 7.5% sales tax

There are ships out there — waiting for you

Sea War

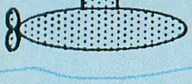
By Jeff Hameluck

Sea War is a one-player game where you try to sink the ships the CoCo has hidden on a 10-by-10 grid. It requires at least 16K Extended Color Basic and the standard CoCo joystick or mouse. It does not use high resolution graphics, but it does use multi-dimensional arrays, thereby requiring Extended Color Basic. *Sea War* will also run on the CoCo 3 if it is run on the 32-column text screen.



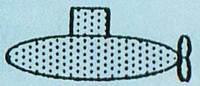
ENEMY CARRIER SUNK!
SHOTS LEFT: 44 HITS: 11

When you run *Sea War*, a title screen will appear and theme music will play. To start the game simply press the right joystick button, and the game will continue. There is no need to wait for the music to cease. The next screen simply gives a little background information about the game's scenario. To continue, press the right joystick button once again. Next, the information on the ships you must sink is displayed (See Figure 1).



Jeff Hameluck is a high school senior who has won a BASIC programming contest sponsored by the Regina Student Chapter of the Association for Computing Machinery.

After you press the button again, the game begins. The computer will put the five ships somewhere on the 10-by-10 grid. It is your job to sink all of the ships in 60 shots or less. The ships will be placed on the grid either vertically or horizontally, but not diagonally. The length of each ship is the same as the number of hits it requires to sink the ship. Therefore, since it takes five hits to sink an Aircraft Carrier, an Aircraft Carrier will be five units long, and so on. Also, each hit has to be in a different part of the ship. In other words, once one part of the ship is hit, a second shell there will just waste ammunition; the shell counts as a shot, not a hit.



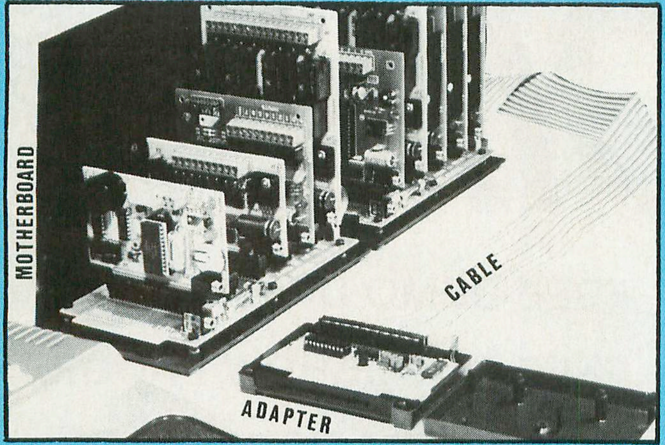
Aircraft Carrier:	5 hits to sink
Battle Ship:	4 hits to sink
Crusier:	3 hits to sink
Submarine:	3 hits to sink
Destroyer:	2 hits to sink

Figure 1

To shoot, use the right joystick to move the cursor on the screen over the top of the square you want to shoot. There are pointers along the vertical and horizontal axes to help guide you. Once you are positioned, press the button. If the square comes up white, there is no ship there. If it comes up showing anything but white, you have hit a ship. The ship will be represented by a two-letter acronym on the game board. The type and location of the ship will be displayed at the top of the screen. The acronyms are listed on the left side of the screen with the number of hits

The Amazing A-BUS

NEW



An A-BUS system with two Motherboards
A-BUS adapter in foreground

The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.

Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS *adapter plugged* into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

Relay Card **RE-140: $129**

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card **RE-156: $99**

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card **AD-142: $129**

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter **AN-146: $139**

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

Digital Input Card **IN-141: $59**

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O **DG-148: $65**

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

Clock with Alarm **CL-144: $89**

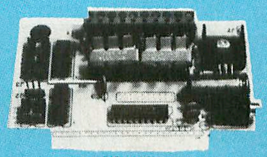
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

Touch Tone® Decoder **PH-145: $79**

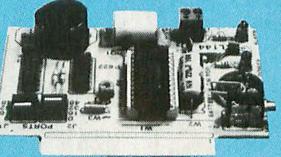
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

A-BUS Prototyping Card **PR-152: $15**

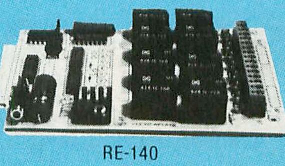
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s



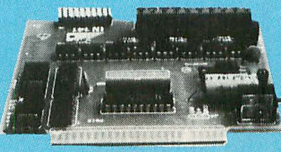
ST-143



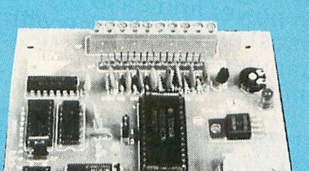
CL-144



RE-140



IN-141



AD-142

Smart Stepper Controller **SC-149: $299**

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option **RC-121: $49**
To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option **PD-123: $89**
Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option **BB-122: $19**
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver **ST-143: $79**

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).
Special Package: 2 motors (MO-103) + ST-143: **PA-181: $99**

Stepper Motors **MO-103: $15 or 4 for $39**

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

A-BUS Adapters for:

IBM PC, XT, AT and compatibles. Uses one short slot.	AR-133...$69
Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot.	AR-133...$69
Apple II, II+, IIe. Uses any slot.	AR-134...$49
TRS-80 Model 102, 200 Plugs into 40 pin "system bus".	AR-136...$69
Model 100. Uses 40 pin socket. (Socket is duplicated on adapter).	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable).	AR-132...$49
TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed).	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I.	AR-131...$39
Color Computers (Tandy). Fits ROM slot. Multipak, or Y-cable.	AR-138...$49

A-BUS Cable (3 ft, 50 cond.) **CA-163: $24**

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.
Special cable for two A-BUS cards: **CA-162: $34**

A-BUS Motherboard **MB-120: $99**

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

- The A-BUS is not a replacement for the Multi-pak

Add $3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
CT & NY residents add sales tax.
C.O.D. add $3.00 extra.
Canada: shipping is $5
Overseas add 10%

ALPHA Products
a Sigma Industries Company
242-W West Avenue, Darien, CT 06820

Technical info:	(203) 656-1806
Orders only Except in CT	800 221-0916
Connecticut orders:	(203) 348-9436

All lines open weekdays 9 to 5 Eastern time

SPECIAL

WITH YOUR
COCO MAX III ORDER:

- FREE DEMO DISK
- FREE COCOSHOW PROGRAM
- FREE EXTRA FONTS DISK

CoCo Max™ III

must be the most enjoyable, useful, and awesome program you've ever seen or your money back. Instantly, no questions asked.

CALL NOW TOLL FREE 1-800 221 Mon-Fri 9 to 5 EST **AND LET THE FUN BEGIN**

A FEW QUOTES :

> An outstanding program that almost turns your CoCo into a replica of the Macintosh. Terrific hi-res color, very easy to learn and use.
> ***- Family Computing***

> There is absolutely nothing else on the Color Computer that is comparable to CoCo Max's power and ease of use. The most enjoyable time with a computer I ever had.
> ***- Computerware Review***

> I never expected to see anything like it on my CoCo screen. There isn't a single command to remember. Even a person who has no drawing ability like myself can create a presentable picture. I've spent hours just doodling enjoying all the things from silly to the serious. Fascinating experience. Buy it, you won't be sorry.
> ***- 6809 Express***

> *In Everyone's book, CoCo Max is rated again and again as the most incredible product ever marketed for the CoCo.*
> *–CoCo America Club*

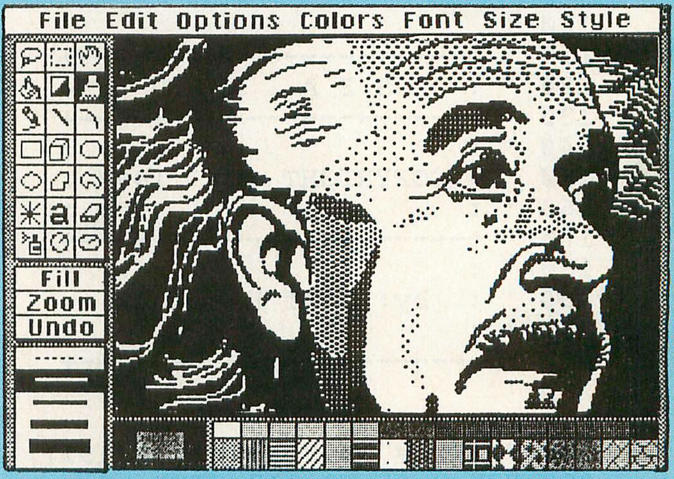
Note: There is only one *CoCo Max III*. Do not confuse **COLORWARE**'s *CoCo Max* with similar sounding imitations.

INTRODUCING THE NEXT GENERATION: CoCo Max™ III*

More Resolution
More Power
More Color
Built-in Animation
More Speed
More Type Styles
More Tools
Amazing Color Sequencing

"The best program ever written for the Color Computer"

That's how thousands of enthusiastic users rated the **CoCo Max II** drawing program. With **CoCo Max III** we are ready to amaze them again. Instead of "patching" CoCo Max II, we rewrote it from scratch to take advantage of the CoCo Max III hardware. The results will knock your socks off! Below is a brief list of some of the *new* features, but some, such as **animation**, **color sequencing**, or the **slide show**, have to be seen. Send for the Demo Disk, and see for yourself.



Imagine this picture in sixteen colors!

Everybody's favorite drawing package features:
- A 50% larger editing window. - Zoom area **400%** larger. - New drawing tools: **rays**, **3D cubes**, **arcs**,... - New editing tools: shadow,text size,... - Rotate by 1.5° steps - Select any 16 of the 64 possible colors (all 64 colors displayed at once!) - Powerful **color mix**: additive, subtractive, overlay,... - Full **color editing** of patterns and color changing patterns. - Incredible **special effects** with **color cycling** up to 8 colors with variable speed. -**Animation** adds the dimension of motion to your image. (Must be seen.) - Sophisticated data compression saves up to 70% of disk space when saving pictures.

In addition, there are dozens of enhancements to the multitude of features that made CoCo Max II a best seller.

More about CoCo Max III

- CoCo Max III is not an upgrade of CoCo Max II. It is entirely rewritten to take advantage of the new CoCo 3 hardware (More memory, resolution, colors, speed,...)
- The new CoCo Max III **Hi-Res Interface** and the CoCo Max II **Hi-Res Pack** are *not* interchangable.
- The new interface plugs into the joystick connector.
- The CoCo Max III disk is not copy protected.
- CoCo Max III only works with the CoCo 3.
- A Y-Cable or Multi-pak is not necessary.
- Colors are printed in five shades of gray.
- CoCo Max III can read CoCo Max II pictures.

> Note: CoCo Max II (for the CoCo 2) is still available on disk ($79.95). CoCo Max I is still available on tape ($69.95). For details, refer to our double page ad in any *Rainbow* from January '86 to July '87

Toll Free operators are for orders only. If you need precise answers, call the **tech line**. (Detailled CoCo Max specs are included with the Demo Disk.)

Add $3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
CT residents add sales tax.
C.O.D. add $3.00 extra.
Canada: shipping is $5
Overseas add 10%

Technical info: **(203) 656-1806**
Orders only Except in CT **800 221-0916**
Connecticut orders: **(203) 348-9436**
All lines open weekdays 9 to 5 Eastern time

* Beware of inferior imitations that *DO NOT* include a Hi-Res Interface or charge extra for each utility.

Guaranteed Satisfaction
Use CoCo Max for a full month.
If you are not delighted with it,
we will refund every penny.

System Requirements:
Any CoCo 3 disk system with a Joystick or a Mouse.

We apologize to tape users, CoCo Max III needs the flexibility of a disk.

The **CoCo Max III** system includes: ● The special Hi-Res interface (for your mouse or joystick) ● The CoCo Max III disk ● Many utilities: (To convert Max II pictures, Max colors, etc.) ● A detailled User's Manual. Complete system; nothing else to buy. **CoCo Max III: $79.95***

WITH COUPON ONLY

FREE DEMO DISK

Name
Street
City
State Zip
Printer used:

Please include $2 to help defray Processing and Shipping costs. (Check, Money Order, etc. Sorry, no COD or Credit Cards). Coupon (or copy) must be mailled to:

COLORWARE

A division of Sigma Industries, Inc.

COLORWARE
242-W West Avenue
Darien, CT 06820

required to sink that vessel.

The game will end after you have either hit and sunk all five ships or used up all 60 rounds of ammunition. Either way, the screen will display the true locations of all the ships. You will then be given a rating of one to 10 based on your shots-to-hits ratio. To play again, press Y or the right joystick button. To quit, press N. If neither of these keys are pressed, the game will start over at the theme song.

(Questions or comments regarding this program may be directed to the author at 67 Dutton Crescent, Regina, Saskatchewan, Canada S4N 4E4. Please enclose an SASE when requesting a reply.) ☐

410	44	1510	115
630	87	1740	98
740	180	1900	239
960	53	2050	18
1270	224	END	130

The listing: SEAWAR

```
100 '
110 ' +---------------------+
120 ' :    S E A   W A R    :
130 ' +---------------------+
140 ' :                     :
150 ' : COPYRIGHT (C)  1988 :
160 ' :                     :
170 ' +---------------------+
180 ' :                     :
190 ' :  by: Jeff Hameluck  :
200 ' :                     :
210 ' +---------------------+
220 '
230 CLS 0
240 PRINT @ 33,STRING$(30,191);
250 FOR X=65 TO 417 STEP 32
260 PRINT @ X,CHR$(191);
270 PRINT @ X+29,CHR$(191);
280 NEXT X
290 PRINT @ 449,STRING$(30,191);
300 A$="jeff"
310 GOSUB 490
320 PRINT @ 100,B$;
330 A$="hameluck"
340 GOSUB 490
350 PRINT @ 109,B$;
360 A$="proudly"
370 GOSUB 490
380 PRINT @ 169,B$;
390 A$="presents"
400 GOSUB 490
410 PRINT @ 232,B$;
420 A$="sea"+CHR$(128)+"war"
430 GOSUB 490
440 PRINT @ 297,B$;
450 B$=CHR$(128)
460 PRINT @ 356,"press";B$;"the"
;B$;"right";B$;"joystick";
470 PRINT @ 393,"button";B$;"to"
;B$;"play";
480 GOTO 550
490 B$=""
500 FOR X=1 TO LEN(A$)
510 B$=B$+MID$(A$,X,1)+CHR$(128)
520 NEXT X
530 B$=LEFT$(B$,LEN(B$)-1)
540 RETURN
550 FOR X=1 TO 55
560 READ A$
570 PP=PEEK(65280)
580 IF PP=254 OR PP=126 THEN 660
590 PLAY A$
600 NEXT X
610 RESTORE
620 GOTO 550
630 DATA "T5L8O4C","O3B","O4L4C"
,"O3C","C","L8G","F","E","G","O4
C","O3B","O4C","L8O4E","D","C","
O4"
640 DATA "L4D","O3D","D","L8D","
C","O2B","O3G","G","F+","L4G","L
8O3A","B","O4C","O3B","A","G","A
"
650 DATA "G","F","E","F","E","D"
,"C","D","C","O2B","A","L8O2G","
O3C","O2B","O3D","C","E","D","F"
,"L4E","C","C"
660 CLS
670 PRINT
680 PRINT"  YOU COMMAND A SHORE
BATTERY  WHICH HAS BEEN ORDERED
 TO SINK  AN ENEMY FLEET ANCHORE
D IN A    FOGGY COVE IN FRONT OF
 YOU. YOU CAN'T SEE THE SHIPS RI
GHT AWAY  BUT AS SOON AS YOU HIT
 ONE THE  LOCATION AND TYPE OF S
HIP WILL  BE KNOWN";
690 PRINT" BECAUSE THE EXPLOSION
  WILL HIGHLY ILLUMINATE THE
  THE IMMEDIATE AREA FOR A SHORT
  TIME.  YOU ONLY HAVE 60 ROUNDS
  TO SINK THE 5 SHIP ENEMY FLEET
  WHICH CONSISTS OF:"
700 PRINT @ 482,"PRESS THE BUTTO
N TO CONTINUE";
710 FOR X=1 TO 200
720 NEXT X
730 PP=PEEK(65280)
740 IF PP=254 OR PP=126 THEN 750
 ELSE 730
750 CLS:PRINT"AIRCRAFT CARRIER-5
 HITS TO SINK BATTLE SHIP      -4
 HITS TO SINK CRUISER          -3
 HITS TO SINK SUBMARINE        -3
 HITS TO SINK DESTROYER        -2
 HITS TO SINK"
760 PRINT @ 482,"PRESS THE BUTTO
N TO CONTINUE";
770 FOR X=1 TO 200
780 NEXT X
790 PP=PEEK(65280)
```

VIP Writer III

VIP Writer has ALWAYS led the pack with features and now VIP Writer III still leads the way! The chart below illustrates this fact. Telewriter 128 only gives you 48K for text. Why is it called Telewriter 128? Word power 3 gives only 72K! VIP Writer III makes use of over 106K! VIP Writer III is the ONLY CoCo 3 word processor worthy of it's name!

WORD PROCESSOR COMPARISON CHART

CoCo3 with 128K	VIP Writer III	Telewriter 128	Word Power 3
Text Storage	OVER 49,000	48,000	72,000
Print Spooler	YES 57,000	NONE	NONE
Total Storage	**106,000**	48,000	72,000
Spelling Checker	VIP Speller	NONE	FREE WARE
RGB HD Support	100%	NONE	NONE
Screen Display	32/40/64/80	40/80	80

SCREEN DISPLAY OPTIONS

As the chart above shows - VIP Writer III offers more screen width options -all with 24 lines and actual lower case letters. It uses the CoCo 3's hardware display and double clock speed and is VERY VERY FAST! You can choose fore and background colors from up to 64 different hues. Color can be turned ON or OFF for the best possible display using a color or monochrome monitor or TV set. VIP Writer III has a built in on-line context sensitive help facility which displays command usage in easy to read colored windows.

CUSTOMIZER & PRINTER INSTALLER

VIP Writer III comes with a configuration / printer installation program which lets you customize VIP Writer III to suit your own liking. You can set screen width and colors as well as margins and more. You can also install your own printer and set interface type (serial, parallel or J&M), baud rate, line feeds, etc. Once done, you never have to enter these parameters again! VIP Writer III will load n' go with your custom configuration every time!

TEXT FILE STORAGE

VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII file format. You can use VIP Writer III to even create BASIC programs! There is a 49K text buffer and disk or cassette file linking allowing virtually unlimited text space. VIP Writer III works with up to four disk drives and lets you display disk directories and free space as well as rename or kill disk files. In addition VIP Writer III is 100% compatible with the RGB Computer Systems HARD DISK.

EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead • typamatic key repeat and key beep for flawless text entry • end of line bell • full four way cursor control with scrolling • top of textfile • bottom of textfile • page up • page down • top of screen • bottom of screen • beginning of line • end of line • left one word • right one word • DELETE character, to beginning or end of line, word to the left or right, or entire line • INSERT character or line • LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards • BLOCK copy, move or delete with up to TEN simultaneous block manipulations • TAB key and programmable tab stops • word count • line restore • three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and multiple copy printing.

TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! Parameters can be altered ANYWHERE!

PREVIEW PRINT WINDOW

VIP Writer III features an exclusive format window which allows you to preview your document BEFORE PRINTING IT! You are able to move up, down, left and right to see centered text, margins, page breaks, orphan lines etc. This makes hyphenation a snap!

PRINTING

VIP Writer III prints TWICE as fast as any other CoCo word processor! It supports most serial or parallel printers using J&M JFD-CP or Rainbow interface and gives you the ability to select baud rates from 110 to 19,200. You can imbed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has TWENTY programmable printer macros which allow you to easily control all of your printers capabilities such as bold, underline, italics and superscript using simple key strokes. Other features include: multiple copy printing • single sheet pause • line feeds.

PRINT SPOOLING

Save up to $150 on a print spooler because VIP Writer III has a built in print spooler with a 57,000 character buffer which allows you to print one document WHILE you are editing another. You don't have to wait until your printer is done before starting another job!

DOCUMENTATION

VIP Writer III is supplied with a 125 page instruction manual which is well written and includes many examples. The manual has a tutorial and glossary of terms for the beginner as well as a complete index! VIP Writer III includes VIP Speller. DISK $79.95
Cassette version does not include VIP Speller. TAPE $59.95

VIP Writer owners: Upgrade to the VIP Writer III Disk for $49.95 or Tape for $39.95. Send original disk or tape. Include $3 S/H.

It's Word Processor Trade In Time

For a limited time you can trade in your old software for the VIP Writer I or III and save up to $20! Send in your old disk or tape and manual. VIP Writer tape $34.95, disk $49.95. VIP Writer III tape $44.95, disk $59.95. Include $3.00 shipping. Offer expires 8/31/88

VIP Database III

The VIP Database III features selectable screen displays of 40, 64 or 80 characters by 24 lines with choice of 64 foreground and background colors for maximum utility. It uses the CoCo 3's hardware screen and double clock speed to be the FASTEST database available! VIP Database III will handle as many records as will fit on your disks and is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses,etc., in ascending or descending alphabetical or numeric order. Records can be searched for specific entries using multiple search criteria. With Database III mail-merge you may also combine files, sort and print mailing lists, print form letters, address envelopes - the list is endless. The built-in MATH package even performs arithmetic operations and updates other fields. VIP Database III also has a print spooler and report generator with unlimited print format capabilities including embeddable control codes for use with ALL printers. DISK $69.95

VIP Database owners: Upgrade to the VIP Database III Disk for $39.95. Send original disk. Include $3 shipping.

VIP Integrated Library

The VIP Integrated Library combines all six popular VIP application programs - VIP Writer*, Speller, Calc, Database*, Terminal and Disk-ZAP - into one program on one disk! The program is called VIP Desktop. From the desktop you have instant access to word processing with a spelling checker always in attendance, data management with mail merge, spreadsheet financial analysis, telecommunications and disk maintenance. 64K. required . Include $4.00 shipping for this product. DISK $149.95

*CoCo 3 owners: Purchase the VIP Integrated Library /WDE (Writer & Database Enhanced) which has the VIP Writer III and VIP Database III in place of the VIP Writer and VIP Database. Include $4.00 shipping for this product. DISK $169.95

Previous VIP Library owners: Call or write for upgrade pricing.

VIP Writer

VIP Writer is also available for CoCo 1 and 2 owners and has all the features found in the VIP Writer III including VIP Speller except for the following: The screen display is 32, 51, 64 or 85 columns by 21 or 24 rows. Screen colors are green, black or white. Help is not presented in colored windows. Double clock speed is not supported. Parallel printer interface is not supported. Print spooler is not available. Hard disk is not supported. Even so, VIP Writer still out-features the rest! It's a CoCo 1 or 2 owners best choice in word processors. Includes VIP Speller. DISK $69.95
Cassette version does not include VIP Speller. TAPE $49.95

VIP Speller

VIP Speller works with ANY ASCII file created by most popular word processors. It automatically checks text files for words to be corrected, marked for special attention or even added to the dictionary. You can even view the misspelled word in context! VIP Speller comes with a specially edited 50,000 word dictionary, and words can be added to or deleted from the dictionary or you can create your own. DISK $34.95

VIP Database

VIP Database has all the features of VIP Database III except the screen widths are 51, 64 and 85. Screen colors are green, black and white, double speed is not supported, spooler is not available. Still VIP Database is the best database for the CoCo 1 & 2! DISK $49.95

VIP Calc

Now every CoCo owner has access to a calculating and planning tool better than VisiCalc™, containing all its features and commands and then some. VIP Calc displays 32, 51, 64 or 85 characters by 21 or 24 lines right on the screen. VIP Calc allows up to a 33K worksheet with up to 512 columns by 1024 rows! In addition, VIP Calc has multiple windows which allow you to compare and contrast results of changes. Other features include 16 DIGIT PRECISION • trig. functions • averaging • algebraic functions • column and row ascending and descending SORTS • locate formulas or titles in cells • block move and replicate • global or local column width • limitless programmable functions • works with ANY printer. Embed printer control codes for customized printing. Combine spreadsheet data with VIP Writer documents to create ledgers, projections, statistical and financial budgets and reports. Requires 64K. DISK $59.95

VIP Terminal

For your important communications needs you've got to go beyond software that only lets you chat. You need a smart terminal so that you can send and receive programs and messages and print them! The VIP Terminal features 32, 51, 64 or 85 characters by 21 or 24 lines on the screen and has a 43K byte buffer to store information. DISK $39.95

VIP Disk-ZAP

VIP Disk-ZAP is the ultimate disk repair utility for simple and quick repair of most disk errors. Designed with the non-programmer in mind, the VIP Disk-ZAP will let you retrieve all types of bashed files, BASIC and Machine Language programs. It even works with 40 track drives! The 50 page tutorial makes the novice an expert. DISK $24.95

All disk products are unprotected and run under RSDOS.

SD ENTERPRISES

☎(503) 663-2865 ✉POB 1233 Gresham, OR 97030

Please add $3 for shipping and handling. Outside continental US add $4 S/H. COD orders add an additional $2.25. Checks allow 3 weeks for delivery. All other orders are shipped the same day.

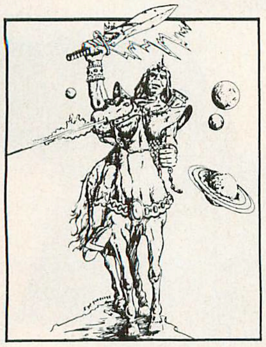
Telewriter 128 is a trademark of Cognitec. Word Power 3 is a trademark of Microcom Software.

```
800 IF PP=254 OR PP=126 THEN 810
 ELSE 790
810 CLS
820 DIM L(9,9)
830 DIM G$(12)
840 S(1)=5
850 S(2)=4
860 S(3)=3
870 S(4)=3
880 S(5)=2
890 G$(0)=CHR$(175)+CHR$(175)
900 FOR X=1 TO 5
910 G$(X)=G$(0)
920 NEXT X
930 G$(6)="ac"
940 G$(7)="bs"
950 G$(8)="cr"
960 G$(9)="sb"
970 G$(10)="de"
980 G$(11)=CHR$(207)+CHR$(207)
990 G$(12)=CHR$(191)+CHR$(191)
1000 A$=STRING$(20,175)
1010 PRINT @ 103,"0 1 2 3 4 5 6
7 8 9"
1020 FOR X=0 TO 9
1030 PRINT @ 134+X*32,RIGHT$(STR
$(X),1);A$;RIGHT$(STR$(X),1);
1040 NEXT X
1050 PRINT @ 455,"0 1 2 3 4 5 6
7 8 9"
1060 PRINT @ 129,"ac-5";
1070 PRINT @ 193,"bs-4";
1080 PRINT @ 257,"cr-3";
1090 PRINT @ 321,"sb-3";
1100 PRINT @ 385,"de-2";
1110 A=RND(-TIMER)
1120 FOR I=1 TO 5
1130 A=RND(49)
1140 FOR X=1 TO A
1150 B=RND(2)
1160 NEXT X
1170 IF B=1 THEN 1310
1180 V=RND(10)-1
1190 IF V>5 THEN V=V-5
1200 H=RND(10)-1
1210 FOR X=V TO V+S(I)-1
1220 IF L(H,X)<>0 THEN 1130
1230 NEXT X
1240 FOR X=V TO V+S(I)-1
1250 L(H,X)=I
1260 NEXT X
1270 GOTO 1400
1280 L(X,H)=I
1290 NEXT X
1300 GOTO 1400
1310 H=RND(10)-1
1320 IF H>5 THEN H=H-5
1330 V=RND(10)-1
1340 FOR X=H TO H+S(I)-1
1350 IF L(X,V)<>0 THEN 1130
1360 NEXT X
```

```
1370 FOR X=H TO H+S(I)-1
1380 L(X,V)=I
1390 NEXT X
1400 NEXT I
1410 OX=10
1420 OY=10
1430 PRINT @ 37,"SHOTS LEFT:";60
-SH;" HITS:";HT
1440 IF HT=17 THEN 2000
1450 IF SH=60 THEN 2000
1460 X=INT(JOYSTK(0)/7)
1470 Y=INT(JOYSTK(1)/7)
1480 PRINT @ 135+X*2+Y*32,G$(12)
;
1490 IF OX=X THEN 1520
1500 PRINT @ 487+(X*2),"^";
1510 PRINT @ 487+(OX*2)," ";
1520 IF OY=Y THEN 1550
1530 PRINT @ 156+(Y*32),"_";
1540 PRINT @ 156+(OY*32)," ";
1550 OY=Y
1560 OX=X
1570 PRINT @ 135+X*2+Y*32,G$(L(X
,Y));
1580 PP=PEEK(65280)
1590 IF PP=254 OR PP=126 THEN 16
10
1600 GOTO 1460
1610 PRINT @ 0
1620 SH=SH+1
1630 PLAY"O1L255V31"
1640 FOR M=1 TO 31
1650 PLAY"N10N3N5N4N2N6V-":NEXT
M
1660 Z=135+X*2+Y*32
1670 IF L(X,Y)=0 THEN 1970
1680 IF L(X,Y)=>6 THEN 1430
1690 HT=HT+1
1700 C=L(X,Y)
1710 ON C GOTO 1720,1770,1820,18
70,1920,
1720 PRINT @ Z,"ac";
1730 L(X,Y)=6
1740 HA=HA+1
1750 IF HA=5 THEN PRINT @ 6,"ENE
MY CARRIER SUNK!" ELSE PRINT @ 4
, "ENEMY CARRIER HIT AT ";RIGHT$
(STR$(X),1);",";RIGHT$(STR$(Y),1
)
1760 GOTO 1430
1770 PRINT @ Z,"bs";
1780 L(X,Y)=7
1790 HB=HB+1
1800 IF HB=4 THEN PRINT @ 5,"ENE
MY BATTLESHIP SUNK!" ELSE PRINT
@ 2,"ENEMY BATTLESHIP HIT AT ";R
IGHT$(STR$(X),1);",";RIGHT$(STR$
(Y),1)
1810 GOTO 1430
1820 PRINT @ Z,"cr";
1830 L(X,Y)=8
```

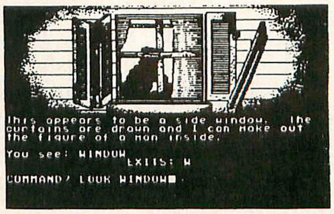
```
1840 HC=HC+1
1850 IF HC=3 THEN PRINT @ 7,"ENE
MY CRUISER SUNK!" ELSE PRINT @ 4
,"ENEMY CRUISER HIT AT ";RIGHT$(
STR$(X),1);",";RIGHT$(STR$(Y),1)
1860 GOTO 1430
1870 PRINT @ Z,"sb";
1880 L(X,Y)=9
1890 HD=HD+1
1900 IF HD=3 THEN PRINT @ 5,"ENE
MY SUBMARINE SUNK!" ELSE PRINT @
 3,"ENEMY SUBMARINE HIT AT ";RIG
HT$(STR$(X),1);",";RIGHT$(STR$(Y
),1)
1910 GOTO 1430
1920 PRINT @ Z,"de";
1930 L(X,Y)=10
1940 HE=HE+1
1950 IF HE=2 THEN PRINT @ 5,"ENE
MY DESTROYER SUNK!" ELSE PRINT @
 3,"ENEMY DESTROYER HIT AT ";RIG
HT$(STR$(X),1);",";RIGHT$(STR$(Y
),1)
1960 GOTO 1430
1970 PRINT @ Z,CHR$(207);CHR$(20
7);
1980 L(X,Y)=11
1990 GOTO 1430
2000 FOR Y=0 TO 9
2010 FOR X=0 TO 9
2020 IF L(X,Y)=0 THEN L(X,Y)=11
2030 IF L(X,Y)<6 THEN L(X,Y)=L(X
,Y)+5
2040 PRINT @ 135+X*2+Y*32,G$(L(X
,Y));
2050 NEXT X,Y
2060 FOR X=1 TO 3500
2070 NEXT X
2080 CLS
2090 PRINT "SHOTS:";SH;" HITS:";
HT
2100 PRINT
2110 PRINT "ON A SCALE OF 1 TO 1
0"
2120 PRINT USING "YOU RATE A: ##
";(61-SH)/4.5+.5
2130 PRINT @ 487,"PLAY AGAIN <Y/
N>";
2140 FOR X=1 TO 1000
2150 A$=INKEY$
2160 PP=PEEK(65280)
2170 IF PP=254 OR PP=126 THEN CL
EAR:GOTO 810
2180 IF A$="Y" THEN CLEAR:GOTO 8
10
2190 IF A$="N" THEN CLS:END
2200 NEXT X
2210 RUN
```

SUNDOG SYSTEMS



In Quest of the Star★Lord

A new animated graphic adventure for the Color Computer 3 from the author of the Hall of the King trilogy! Enjoy the mixture of science and fantasy as you quest for the Phoenix Crossbow, the only thing that can save you in the post-holocaust world. A full 4 disk sides of adventure! Outstanding 320x200 graphics will make this your favorite CoCo adventure! Req. 128K CoCo 3 and disk drive. Only $34.95.



```
This appears to be a side window. The
curtains are drawn and I can make out
the figure of a man inside.
You see: WINDOW
              EXITS: W
COMMAND/ LOOK WINDOW■
```

WHITE FIRE OF ETERNITY

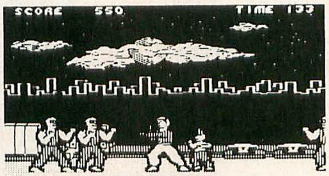
64K Animated Graphic Adventure. See 12/86 Rainbow review. Only $19.95.

Kung-Fu Dude

An exciting new arcade game. This is the long-awaited response to the huge demand for a Kung-Fu program for the CoCo. The graphics, sound effects, and animation are spectacular! This is the BEST karate game ever available for the Color Computer. Req. 64K, disk drive, and joystick. Only $24.95.

"The CoCo karate gap has been filled and Kung-Fu Dude does it excellently. I highly recommend (it)!" –2/88 Rainbow review

"A definite 5 stars!" –12/87 Wizard's Castle review



CHAMPION

64K Superhero Action Adventure. See 5/87 Rainbow review. Only $19.95.

All programs CoCo 1, 2, 3 compatible unless stated otherwise.

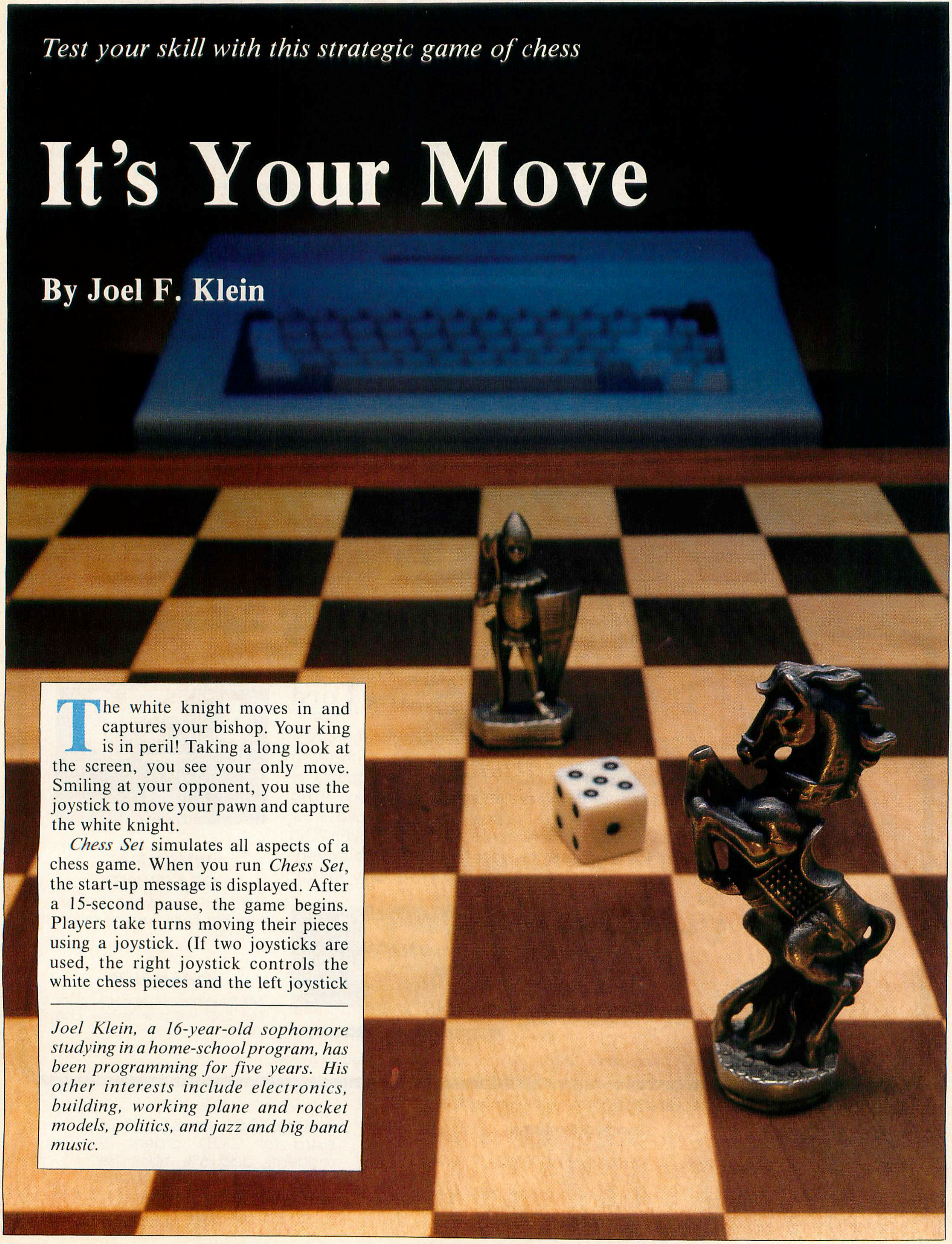
Sundog Systems
21 Edinburg Drive
Pittsburgh, PA 15235
(412) 372-5674
Personal checks, money orders, and C.O.D. orders accepted.

Include $2.50 for S/H. $3.00 extra for C.O.D. orders. PA residents add 6% sales tax. Authorship and dealer inquiries welcome.

Test your skill with this strategic game of chess

It's Your Move

By Joel F. Klein



The white knight moves in and captures your bishop. Your king is in peril! Taking a long look at the screen, you see your only move. Smiling at your opponent, you use the joystick to move your pawn and capture the white knight.

Chess Set simulates all aspects of a chess game. When you run *Chess Set*, the start-up message is displayed. After a 15-second pause, the game begins. Players take turns moving their pieces using a joystick. (If two joysticks are used, the right joystick controls the white chess pieces and the left joystick

---

Joel Klein, a 16-year-old sophomore studying in a home-school program, has been programming for five years. His other interests include electronics, building, working plane and rocket models, politics, and jazz and big band music.

Telewriter-128™

the Color Computer 3 Word Processor

For over 5 years now, Telewriter has been the #1 Color Computer word processor, both in popularity and in performance. Telewriter's near perfect mix of sophisticated professional features and a very natural user interface, has earned it the highest praise in numerous magazines, and an intensely loyal following among tens of thousands of Color Computer users all over the world.

HISTORY

Throughout the history of the Color Computer, Telewriter has pioneered software breakthroughs that set the standards.

In 1981, it was Telewriter 1.0 that first took the Color Computer's inadequate 32X16 all-uppercase display, and replaced it with a graphics-based 51X24 upper and lowercase display.

A few years later, Telewriter-64 added high density 64X24 and 85X24 displays and access to the full 64K of the newer Color Computers.

THE NEW AGE

Today, Telewriter-64 is recognized as the standard Color Computer word processor. It runs on all Tandy Color Computers — from the original Color Computer 1, to the Color Computer 2, and 3.

But the Color Computer 3 brings a whole new level of power to low cost computing and, so, a new Telewriter is here to put that power to work for you. We call it Telewriter-128.

TELEWRITER-128

You don't mess with a good thing, so Telewriter-128 is still Telewriter-64 at heart. The commands, and the user interface are essentially the same. If you know Telewriter-64, then you already know Telewriter-128. And, if you don't know Telewriter-64, you'll still have an easy time learning and using Telewriter-128.

80 COLUMNS

But there are major differences as well. First, Telewriter-128 uses the Color Computer 3's new 80 column screen display.

This means, simply, that using Telewriter-128 on a low cost Color Computer 3 will look a lot like using a more expensive word processor on a much more expensive IBM PC, PS/2, or clone.

SPEED

Second, Telewriter-128 is lightning fast. Telewriter-64 was fast in its own right, but, by accessing the Color Computer 3's video hardware directly, and by running the machine in double speed mode, Telewriter-128 is able to provide extremely fast scrolling and instant paging — functions whose speed is crucial to serious word processing.

In this department, Telewriter-128 doesn't simply keep up with IBM-based word processors — it generally surpasses them!

EASE

Third, Telewriter-128 adds a host of new features big and small, that make it even easier to use.

Features like: Quick function key access to the editor or the menus — an instant on-line help screen summarizing all Telewriter commands and special characters — an option file where you store your personal set of format and screen settings so you only have to set them once!

Then, there's a quick save feature which allows you to save all your current work without leaving the editor. There's a simple way to cursor through the disk directory and read in a file by just hitting ENTER. And there's more.

NEW POWER

Telewriter-64 always had the power to handle any kind of serious writing, from letters to textbooks. But, here too, Telewriter-128 adds major features.

Like Macros — which let you insert whole words or phrases (even sets of control codes or format commands) into your text, with a single keypress. And every time you power up Telewriter-128, the macro definitions are automatically loaded*, so they're always there.

Then there's a Print Preview feature that shows you, on-screen, the way your printed text will look — with margins, headers, centering, justification, page numbering, and page breaks. This guarantees letter perfect documents every time, and makes tasks like widow/orphan line elimination, a breeze.

TELEWRITER-64 OR TELEWRITER-128

We could go on listing features, but the point is this: If you own a Color Computer, you already have the hardware for the most powerful, low cost word processor in town. All you need now is to add the heart and soul:

Telewriter-64, for the Color Computer 1 and 2, costs $59.95 on disk, $49.95 on cassette.

Telewriter-128 for the Color Computer 3 costs $79.95 on disk, $69.95 on cassette.

To order by Mastercard or Visa call (619) 755-1258 anytime, or send check or money order plus $2 shipping (Californians add 6% sales tax) to:

COGNITEC
704 Nob Ave.
Del Mar, CA 92014

To upgrade from Telewriter-64 to Telewriter-128, return your original disk or cassette with $39.95. (Add $10 if you're also upgrading from cassette to disk. Deduct $10 with proof of Oct '87 - Feb '88, purchase of Telewriter-64.)

> *When I first got Telewriter-64 last year, I was in heaven. I couldn't believe the program's versatility and ease of use.*
> -The RAINBOW, Oct. 1985

TELEWRITER-64 FEATURES: Compatibility with any printer that works with the Color Computer; embedded control codes for underlining, boldface, sub/superscript, variable fonts; format commands for headers, centering, margin and spacing changes anywhere in the document; Format menu to set margins, spacing, page numbering, BAUD rate, lines per page, justification; Chain printing for one shot printing of multi-file documents. Fast, full-screen editor with wordwrap, block copy/move/delete, global search and replace, wild card search, fast 4-way auto-repeat cursor, fast scrolling, forward and backward paging, text alignment, tabs, error protection, word and line counter. Insert or delete text anywhere on the screen. Simple, easy to remember commands. Optional ASCII files for compatibility with spell checkers, terminal programs, and BASIC. Load, save, append, partial save files to disk or cassette. Kill, rename and list disk files. Cassette verify and auto-retry on error.

TELEWRITER-128 - ADDITIONAL FEATURES: Print preview from editor; multiple copy print; footers; hanging indents; cursor thru disk directory to load, append, rename and kill files; quick file save from editor; keyclick; key repeat; true block move; 24, 25, or 28 line screen; 40 or 80 column screen; dual speed cursor; on-line help; overstrike mode; word delete; wordwrap at margin; user definable macros; nested macros; instant status window for information on cursor position, word count, etc.; instant function key access to menus or editor; options menu for setting character and screen colors, key repeat and delay rates, definable foreign symbols.

IBM and PS/2 are trademarks of International Business Machines Inc. *disk version only

T & D SUBSCRIPTION SOFTWARE CELEBRATES 6 YEARS

ISSUE #1, JULY 1982
- COVER 1
- RACE TRACK
- HANGMAN
- MUSIC ALBUM
- LIFE EXPECTANCY
- WORD TESTS
- KILLER MANSION
- BARTENDER
- CALENDAR
- ROBOT WAR

ISSUE #2, AUG. 1982
- UFO COVER PT. 1
- BIORYTHM
- BOMBARDMENT
- BLACK JACK
- COST OF LIVING
- FRENZY
- BUSINESS LETTER
- QUICK THINK
- QUEST INSTRUCTIONS
- QUEST FOR LENORE

ISSUE #3, SEPT. 1982
- UFO COVER PT.2
- BASKETBALL
- CHUCKLUCK
- SLOT MACHINE
- ALPHABETIZER
- NFL *PREDICTIONS*
- FLAG CAPTURE
- ROBOT BOMBER

ISSUE #4, OCT. 1982
- UFO RESCUE
- TANK BATTLE
- DRIVEWAY
- SOUNDS
- BALLOON DROP
- MIND BOGGLE
- COCO-TERRESTRIAL ADV.
- CALORIE COUNTER
- JACK-O-LANTERN

ISSUE #5, NOV. 1982
- CATALOG COVER
- BOWLING
- PROGRAM INVENTORY
- PROMISSORY-LOANS
- CHECKBOOK BALANCER
- TRIGONOMETRY TUTOR
- CONVOY
- BAG-IT
- SPECTRA SOUND
- CONVEYOR BELT

ISSUE #6, DEC. 1982
- CHRISTMAS COVER
- RAINDROPS
- STOCK MARKET
- ADVANCE PONG
- DESTROY
- SOUND ANALYZER
- CREATIVITY TEST
- VOICE DATA
- ML TUTORIAL PT.1
- LOONY LANDER

ISSUE #7, JAN. 1983
- NEW YEARS COVER
- LIST ENHANCER
- SUPER PRECISION DIV.
- BOMB DIFFUSE
- SPACE STATION
- ML TUTORIAL PT. 2
- SHOOT OUT
- FIND UTILITY
- CYBORG INS.
- CYBORG FACES

ISSUE #8, FEB., 1983
- COVER 8
- DEFEND
- 3 DIMENSIONAL MAZE
- COCO CONCENTRATION
- AUTO LINE NUMBERING
- ML TUTORIAL PT.3A
- ML TUTORIAL PT.3B
- NUCLEAR POWER PLANT
- DUAL BARRIER
- BRICKS

ISSUE #9, MARCH 1983
- TIME MACHINE COVER
- TRIG DEMO
- PYRAMID OF CHEOPS
- PROGRAM PACKER
- BUDGET
- ELECTRONIC DATE BOOK
- ML TUTORIAL PT.4
- TAPE DIRECTORY
- BLOCK-STIR
- COCO ADDING MACHINE

ISSUE #10, APRIL 1983
- TENTH COVER
- PYRAMID OF DANGER
- TYPING TUTOR
- ML TUTORIAL PT.5
- TINYCALC
- STOCK MARKET COMP
- YAH-HOO
- MISSILE ATTACK
- SCREEN PRINT
- BRIKPONG

ISSUE #11, MAY 1983
- ELEVENTH COVER
- ARCHERY
- FROG JUMP
- ML TUTORIAL PT.6
- MLT DICTIONARY
- BASIC SPEED UP TOT.
- METRIC CONVERTOR
- GRAPHIC QUAD ANTENNA
- GRAPHICS PROGRAM
- CATERPILLAR CAVE

ISSUE #12, JUNE 1983
- TWELFTH COVER
- SHOOTING GALLERY
- BOMB STOPPER
- VALLEY BOMBER
- STAR FIGHTER
- WHEEL OF FORTUNE
- ML TUTORIAL PT.7
- MERGE UTILITY
- RAM TEST
- LANDER

ISSUE #13, JULY 1983
- THIRTEENTH COVER
- FLASH CARD
- ICE BLOCK
- COSMIC FORTRESS
- MAIL LIST
- DOLLARS & CENTS
- ML TUTORIAL PT.8
- SDSK COPY
- MUSIC SYNTHESIZER
- CRAWLER

ISSUE #14, AUG. 1983
- MYSTERY COVER
- ROW BOAT
- COMPUTER TUTL PT. 1
- INDEX DATA BASE
- DISK ZAPPER
- COCO-MONITOR
- COCO-ARTIST
- ROBOT COMMAND
- TEST SCREEN PRINT
- HIGH RESOLUTION TEXT

ISSUE #15, SEPT. 1983
- MYSTERY COVER PT.2
- GOLD VALUES
- TREK INSTRUCTIONS
- TREK
- HIGH TEXT MODIFICATION
- ASTRO DODGE
- DR. COCO
- PEG JUMP
- MORSE CODE
- PURGE UTILITY

ISSUE #16, OCT. 1983
- MYSTERY COVER
- BOPOTRON
- DIRECTORY RECALL
- VECTOR GRAPHICS INST.
- VECTOR GRAPHICS
- SKYDIVER
- SWERVE AND DODGE
- NIMBO BATTLE
- TAPE ANALYSIS UTILITY
- LIFE GENERATIONS

ISSUE #17, NOV. 1983
- THANKSGIVING COVER
- 3-D TIC-TAC-TOE
- INDY 500
- COLLEGE ADVENTURE
- MEMORY GAME
- DUNGEON MASTER
- WEATHER FORECASTER
- GRID FACTOR INST.
- GRID FACTOR
- DRAW

ISSUE #18, DEC. 1983
- CHRISTMAS COVER
- CLIMBER
- GALACTIC CONQUEST
- WARLORDS
- STATES REVIEW
- MATH TUTOR
- MACHINE LANGUAGE DATA
- PRINTER UTILITY INST.
- PRINTER UTILITY
- MUTANT WAFFLES

ISSUE #19, JAN. 1984
- BANNER
- PROBE
- DISK DIR. PROTECTOR
- OPTICAL CONFUSION
- WORD PROCESSOR
- WORD SEARCH
- ASTRONAUT RESCUE
- STAR TRAP
- PIE CHART
- FORCE FIELD

ISSUE #20, FEB. 1984
- INTRODUCTION
- HINTS FOR YOUR COCO
- ESCAPE ADVENTURE
- SEEKERS
- MASTER BRAIN
- LIST CONTROLLER
- DISKETTE CERTIFIER
- ROM COPY
- BASIC RAM
- SNAFUS

ISSUE #21, MAR. 1984
- BASIC CONVERSIONS
- FINANCIAL ADVISE
- CASTLE STORM
- DOS HEAD CLEANER
- COCO TERMINAL
- SNAKE CRAWLER
- WAR CASTLE
- SKY FIRE
- EASY BASIC
- DOTS 3-D

ISSUE #22, APRIL 1984
- HEALTH HINTS
- GLIBLIBS
- CLOTHER SLITHER
- BIBLE 1 & 2
- BIBLE 3 & 4
- CATCH ALL
- INVADER
- ALIEN RAID
- MOON ROVER
- IO ERROR IGNORER

ISSUE #23, MAY 1984
- MONEY SAVERS 1 & 2
- STOCKS OR BOMBS
- WALL AROUND
- COCO TECHNICAL LOOK PT.1
- NUCLEAR WAR INST.
- THERMONUCLEAR WAR
- CIRCUIT BREAKER
- MOUSE RACES
- SUPER SQUEEZE
- DATA FALL

ISSUE #24, JUNE 1984
- DIR PACK & SORT
- BRICK OUT
- COCO TECHNICAL LOOK PT. 2
- USA SLIDE PUZZLE
- 51 *24 SCREEN EDITOR
- 51 *24 SCREEN EDITOR
- CITY INVADERS
- PRINTER SPOOLER
- STEPS
- SNAKE

ISSUE #25, JULY 1984
- CLOCK
- COCO TECHNICAL LOOK PT.3
- SKID ROW ADVENTURE
- MONEY MAKER
- PIN-HEAD CLEANING
- LINE EDITOR INST.
- LINE EDITOR
- BOOMERANG
- BUBBLE BUSTER
- ROCOCHET

ISSUE #26, AUG. 1984
- PEEK POKE & EXECUTE
- SAUCER RESCUE
- YOUNG TYPER TUTOR
- O-TEL-O
- OLYMPIC EVENTS
- DOUBLE DICE
- COCO DATABASE
- BATTLE STAR
- COCO-PIN BALL
- MONTEZUMAS DUNGEONS

ISSUE #27, SEPT. 1984
- COCO TO COM 64
- GALACTIC SMUGGLER
- INDY RACE
- ACCOUNT MANAGER
- CASSETTE MERGE UTILITY
- STRING PACKING TUTORIAL
- SPACE DUEL
- BUGS
- TRAP-BALL
- BALLOON FIRE

ISSUE #28, OCT. 1984
- HANGING TREE
- CHECKERS
- FOOTBALL
- MORE PEEKS & POKES
- SPELLING CHECKER
- SOUND DEVELOPMENT
- WORD GAME
- SCREEN REVERSE
- AUTO COPY
- RAT ATTACK

ISSUE #29, NOV. 1984
- DISK ROLL OUT
- ROBOT ON
- MULTIPONG
- ADVENTURE GENERATOR
- QUEST ADVENTURE
- QUARTER BOUNCE
- DUAL OUTPUT
- KEY REPEAT
- FULL EDITOR
- METEOR

ISSUE #30, DEC. 1984
- MATH HELP
- ZECTOR ADVENTURE
- WORLD CONQUEST
- DRAG RACE
- MINE FIELD
- T-NOTES TUTORIAL
- T & D PROGRAM INDEXER
- SYSTEM STATUS
- ERROR TRAP
- DROLL ATTACK

ISSUE #31, JAN. 1985
- TREASURES OF BARSOOM
- BATTLEGROUND
- STRUCT. COMPILED LANG.
- MINIATURE GOLF
- STAR DUEL
- ARITHMETIC FOOTBALL
- GRID RUN
- SPIRAL ATTACK
- FAST SORT
- *MUNCHMAN*

ISSUE #32, FEB. 1985
- DR. SIGMUND
- ICE WORLD ADVENTURE
- LOTTERY ANALYST
- BASIC COMPILER
- MUSIC CREATOR
- MEANIE PATROL
- TRI-COLOR CARDS
- SHAPE RECOGNITION
- DISK BACKUP
- SPACE PROTECTOR

ISSUE #33, MAR. 1985
- LIGHT CYCLE
- PAINT
- SKEET SHOOTING
- GUITAR NOTES
- MI DISK ANALYZER
- PERSONAL DIRECTORY
- NAUGHA ADVENTURE
- EGGS GAME
- DISK DIRECTORY PRINT
- SPEED KEy

ISSUE #34, APRIL 1985
- HOVER TANK
- POWER SWORD
- TERMITE INVASION
- SPELLING CHECKER
- DOS BOSS
- NINE CARD CHOICE
- MUSIC GENERATOR
- FYR-DRACA
- DRIVE TEST
- GRAPHIC TOUR

ISSUE #35, MAY 1985
- SELECT A GAME 1
- TAPE PROBLEMS
- STROLL TRIVIA
- SOFTBALL MANAGER
- FONTS DEMO
- CLOWN DUNK MATH
- ALPHA MISSION
- DOS ENHANCER
- KNOCK OUT
- HAUNTED HOUSE

ISSUE #36, JUNE 1985
- SELECT A GAME 2
- VIDEO COMPUTER
- SPEECH SYNTHESIS
- SPEECH RECOGNITION
- SPACE LAB
- AUTO COMMAND
- COMPUTER MATCHMAKER
- KNIGHT & THE LABYRINTH
- STAR SIEGE
- TALKING SPELLING QUIZ

VISA

MasterCard

SUPER SAVINGS

Single Issue $8.00
2-5 Issues .... $6.00 ea.
6-10 ISSUES .... $5.00 ea.
11 or more Issues . $4.50 ea.
All 72 Issues $199.00
Purchase 20 or more issues and receive a free 6 month subscription.

- Every Issue Contains 10 or More Programs
- Many Machine Language Programs
- Available for COCO I, II and III
- All Programs Include Documentation

- We send 1st Class No Charge
- Personal Checks Welcome!

RAINBOW
CERTIFICATION SEAL

AND OVER 720 PROGRAMS WITH A BACK ISSUE SALE!

ISSUE #37, JULY 1985
CHESS MASTER
BIBLE 5-7
SHIP WREK ADVENTURE
FILE TRANSFER
FOUR IN A ROW
MARSHY
TAPE CONTROLLER
CATACOMB
AUTO TALK
SGR8PAK

ISSUE #38, AUG. 1985
GOLF PAR3
WIZARD ADVENTURE
KITE DESIGN
ROBOTS
GOMOKU
AMULET OF POWER
LINE COPY UTILITY
DISK PLUMBER
SUPER RAM CHECKER
GRAPHIC HORSE RACE

ISSUE #39, SEPT. 1985
DRUNK DRIVING
CAR MANAGER
SQUEEZE PLAY
SUPER BACKUP
RECIPE MACHINE
ANTI-AIRCRAFT
UNREASON ADVENTURE
TALKING ALPHABET
SUPER VADERS
AUTOMATIC EDITOR

ISSUE #40, OCT. 1985
STAR TREK
HAM RADIO LOG
COCO WAR
DISK LABELER
SHIP WAR
ELECTRIC COST
MULTIKEY BUFFER
NUKE AVENGER
CURSOR KING
SAND ROVER

ISSUE #41, NOV. 1985
GRUMPS
DISK DRIVE SPEED TEST
SOLAR CONQUEST
GAS COST
RIME WORLD MISSION
WUMPUS
CHARACTER EDITOR
GRAPHIC TEST
GRAPHIC LOOPY
BOLD PRINT

ISSUE #42, DEC. 1985
HOME PRODUCT EVALUATION
YAHTZEE
DISK UTILITY
MACH II
ELECTRONIC BILLBOARD
CAR CHASE
SUPER MANSION ADVENTURE
SLOT MACHINE GIVE AWAY
TEXT BUFFER
TUNNEL RUN

ISSUE #43, JAN. 1986
DUELING CANNONS
WATER COST
ZIGMA EXPERIMENT
MUSICAL CHORDS
SAFE PASSAGE
PASSWORD SCRAMBLER
GUNFIGHT
KEYPAD ENTRY
STYX GAME
PRINTER DIVERT

ISSUE #44, FEB. 1986
HOME INVENTORY
NINE BALL
PRINTER REVIEW
EXPLORER ADVENTURE
SPANISH LESSONS
CROSS FIRE
RAM SAVER
GRAY LADY
JOYSTICK INPUT
COSMIC SWEEPER

ISSUE #45, MAR. 1986
INCOME PROPERTY MGMT.
ELECTRONIC BILLBOARD 2
MOUNTAIN BATTLE
THE FIGHT
COCO KEENO
HOCKEY
LOGICAL PATTERNS
ON SCALE SCREEN
LIBERTY SHIP
SINGLE STEP RUN

ISSUE #46, APRIL 1986
SPECIAL EVENTS REMINDER
DISK LOCK
SMALL BUSINESS MANAGER
BOMB RUN
TANKS
TAR PITS
BASEBALL
NUMBER RELATIONSHIPS
ROULETTE
GLOBAL EDITOR

ISSUE #47, MAY 1986
CHRISTMAS LIST
BLACK HOLE
PITCHING MANAGER
SYMBOLIC DIFF.
BUG SPRAY
OWARE CAPTURE
EASY GRAPHICS
DESERT JOURNEY
SCREEN CONTROL
FULL ERROR MESSAGE

ISSUE #48, JUNE 1986
CHESTER
TV SCHEDULE
BASE RACE
ROMAN NUMERALS
ASTRO DODGE
HIRED AND FIRED
MULTI COPY
AUTO MATE
SCROLL PROJECT
NOISE GENERATOR

ISSUE #49, JULY 1986
COMPUTER I.O.U.
DISK DISASSEMBLER
BAKCHEK
PACHINKO
STOCK CHARTING
HAUNTED STAIRCASE
CANYON BOMBERS
DRAGONS 1 & 2
GRAPHIC SCROLL ROUTINE
AUTO BORDER

ISSUE #50, AUG. 1986
BUSINESS INVENTORY
D & D ARENA
DISK CLERK
PC SURVEY
TREASURE HUNT
SCREEN GENERATOR
ASTRO SMASH
NFL SCORES
BARN STORMING
SMASH GAME

ISSUE #51, SEPT. 1986
ASSET MANAGER
MONEY CHASE
FISHING CONTEST
RIP OFF
HAND OFF
BUDGET 51
VAN GAR
DOS EMULATOR
MEM DISK
VARIABLE REFERENCE

ISSUE #52, OCT. 1986
ACCOUNTS RECEIVABLE
WORKMATE SERIES
CALENDAR
INVASION
THE TRIP ADVENTURE
FOOT RACE
FLIPPY THE SEAL
SCREEN CALCULATOR
ABLE BUILDERS
SUPER ERROR2

ISSUE #53, NOV. 1986
CORE KILL
LUCKY MONEY
COOKIES ADVENTURE
NICE LIST
SPANISH QUIZZES
PAINT EDITOR
CARVERN CRUISER
SNAP SHOT
MEGA RACE
KICK GUY

ISSUE #54, DEC. 1986
JOB LOG
PEGS
DIGITAL SAMPLING
JUNGLE ADVENTURE
PAINT COCO 3
CONVERT 3
COMPUTER TYPE
PANZER TANKS
MRS PAC
BIG NUM

ISSUE #55, JAN. 1987
GRADE BOOK
MAIL LIST
DOWN HILL
FIRE FOX
JETS CONTROL
GALLOWS
DIR MANAGER
FIRE RUNNER
GRAPHICS BORDER
COSMIC RAYS

ISSUE #56, FEB. 1987
CALENDAR PRINT
CRUSH
GALACTA
OCEAN DIVER
CLUE SUSPECT
WORD EDITOR
ALIEN HUNT
DEMON'S CASTLE
PICTURE DRAW
DIG

ISSUE #57, MAR. 1987
THE BAKERY
ENCHANGED VALLEY ADV.
SAFE KEEPER
WAR 1
BOMB DISABLE
PIANO PLAYER
SPREAD SHEET
SLOT MANEUVER
LIVING MAZE
GEM SEARCH

ISSUE #58, APRIL 1987
ACCOUNTS PAYABLE
PRINTER GRAPHICS
SIMON
PANELING HELPER
MULTI CAKES
CAR RACE
ELECTRONICS I
BATTLE TANK
DISKETTE VERIFY
WEIRDO

ISSUE #59, MAY 1987
GENEOLOGY
HOME PLANT SELECTION
CHECK WRITER
HELIRESCUE
KABOOM
NEW PONG
CROQUET
FUNCTION KEYS
ZOOM
ELECTRONICS 2

ISSUE #60, JUNE 1987
JOB COSTING
LABELS
CATCH A CAKE
COCO MATCH
ROBOTS
STREET RACERS
BOWLING 3
ELECTRONICS 3
GRAFIX
KRON

ISSUE #61, JULY 1987
EZ ORDER
SUBMISSION WRITER
KEYS ADVENTURE
WALLPAPER
CHOPPER COMMAND
UNDERSTANDING OPPOSITES
BIT CODE PLOTTING
ELECTRONICS 4
KING PEDE
RAIDER

ISSUE #62, AUG. 1987
PENSION MANAGEMENT
HERB GROWING
CATOLOGER UTILITY
RAIDERS
ALPHABETIZING
U.F.O.
ELECTRONICS 5
RAMBO ADVENTURE
BLOCKS
MULTI SCREEN CAVES

ISSUE #63, SEPT. 1987
GENEOLOGIST HELPER
SMART COPY
MAINTENANCE REPORTING
COCO3-COCO 2 HELPER
DIRECTORY PICTURE
SUB ATTACK
SAVE THE MAIDEN
CAVIATOR
ELECTRONICS 6
MONKEY SHINE

ISSUE #64, OCT. 1987
GARDEN PLANTS
FORT KNOX
ELECTRONICS FORMULAS
SNAKE IN THE GRASS
CYCLE JUMP
GEOMETRY TUTOR
WIZARD
GAME OF LIFE
ELECTRONICS 7
FLIGHT SIMULATOR

ISSUE #65, NOV. 1987
TAXMAN
DAISY WHEEL PICTURES
CHILDSTONE ADVENTURE
SIR EGGBERT
CROWN QUEST
GYM KHANA
COCO 3 DRAWER
FOOTBALL
ELECTRONICS 8
CHOP

ISSUE #66, DEC. 1987
ONE ROOM ADVENTURE
OS9 TUTORIAL
RIVER CAPTAIN
SOUND EFFECTS
BETTING POOL
ADVANCE
MATH TABLES
ELECTRONICS 9
LOWER TO UPPER
NOIDS

ISSUE #67, JAN. 1988
AUDIO LIBRARY
SAVE THE EARTH
WEIGHTS AND MEASURES
LOW RES PICTURES
WORD COUNTER
BACARAT
BATTLE SHIP
ELECTRONICS 10
TAPE CONVENIENCE
PENQUIN

ISSUE #68, FEB. 1988
COINFILE
WORD COUNTER
SQUIRREL ADVENTURE
AREA CODES
DRAW POKER
TURTLE RACES
ELECTRONICS 11
MULTI SCREEN
CANON PRINT
COCO TENNIS

ISSUE #69, MAR. 1988
POLICE CADET
STAMP COLLECTION
BARRACKS ADVENTURE
CITY/TIME
HI-LO/CRAPS
OLYMPICS
HI-RES CHESS
ELECTRONICS 12
DOUBLE EDITOR
DOUBLE BREAKOUT

ISSUE #70, APRIL 1988
BLOTTO DICE
SUPER COM
GENESIS ADVENTURE
PLANETS
PHK/WAR
SIGN LANGUAGE
ARX SHOOTOUT
ELECTRONIÇS 13
MAGIC KEY
SNAP PRINT

ISSUE #71, MAY 1988
SUPER LOTTO
ROBOT ADVENTURE
MAZE
YAHTZEE 3
PHASER
SHAPES & PLATES
STAR WARS
ELECTRONICS 14
PRINTER CONTROL
MAZE 2

ISSUE #72, JUNE 1988
FLYING OBJECTS
THREE STOOGES
HOSTAGE
PROGRAM TRIO
GLADIATOR
US & CAN QUIZ
JEOPARDY
ELECTRONICS 15
COCO 3 PRINT
CTTY COMMUNICATOR

MAIL TO:

T & D Subscription Software
2490 Miles Standish Drive
Holland, Michigan 49424
(616) 399-9648

Name ______________________
Address ______________________
City ____________ State ________ ZIP ____________
Credit Card # ______________________
Expires ______________________
TOTAL AMOUNT $ ______________________

CIRCLE ISSUES DESIRED

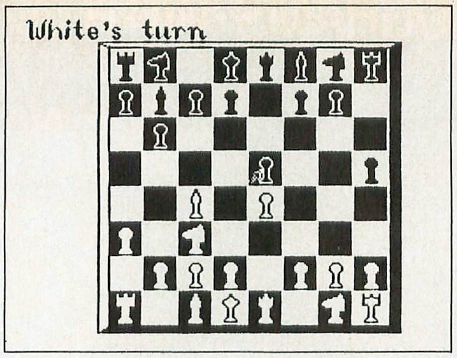
1 9 17 25 33 41 49 57 65
2 10 18 26 34 42 50 58 66
3 11 19 27 35 43 51 59 67
4 12 20 28 36 44 52 60 68
5 13 21 29 37 45 53 61 69
6 14 22 30 38 46 54 62 70
7 15 23 31 39 47 55 63 71
8 16 24 32 40 48 56 64 72

PLEASE CIRCLE
TAPE or DISK

controls the black pieces.) When a small arrow appears on the screen, you are in input mode. The arrow is then moved using the joystick to point to the desired square. Listed below are five play options, which can be used by pressing the corresponding key:

Q	Quit
R	Restarts a new game.
N	Next player
1	1 joystick
2	2 joysticks

The N command is extremely useful for correcting mistakes. For example, if you moved P-K4, intending a P-KB4, press N after the move is made. This will give control back to the same player. Simply move to the intended square, and no harm is done. (However, if you make an accidental capture, the captured piece *cannot* be recovered.) Castling can be accomplished the same way.



The only rule in *Chess Set* is that you must not move one of your pieces to a square containing another of your own pieces. After a moment's thought, you will realize this means you can make illegal moves. There are two reasons for this option: (1) You can make illegal moves with a real set, and (2) the processing time for determining a move's legality would be too long to be convenient.

To move a piece, point the arrow to the piece you want to move and press the fire button. Then, point to the square you want the piece moved to and press the fire button. Captures are sensed automatically, and captured pieces are taken from the board.

When a pawn reaches its eighth rank, you will be informed by a message on the text screen. Press any key and the board will again be displayed, this time with a rook, knight, bishop, and queen to the left of the board. Use the joystick to point to the piece desired, press the fire button, and the pawn is promoted.

When you wish to end the game, simply press Q to return to BASIC, or R to begin a new game. Enjoy the game, and remember to keep your king safe!

(Questions or comments regarding this program may be directed to the author at 4815 Marrison Place, Indianapolis, IN 46226. Please enclose an SASE when requesting a reply.) ☐

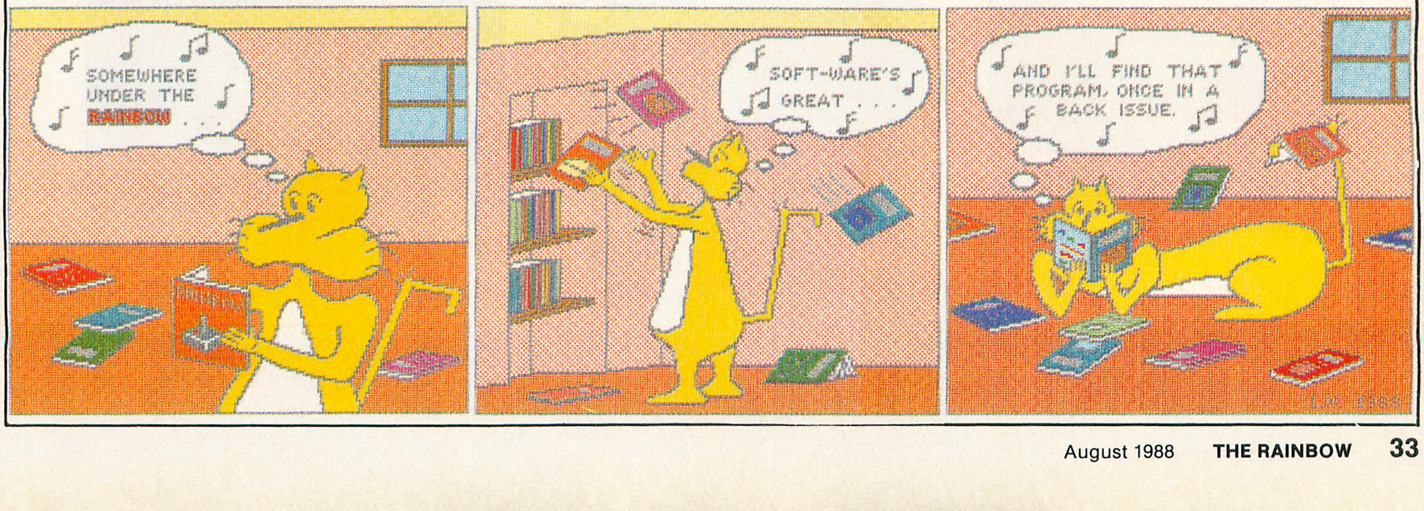
7	216
13	102
21	230
28	180
END	155

The listing: CHESS

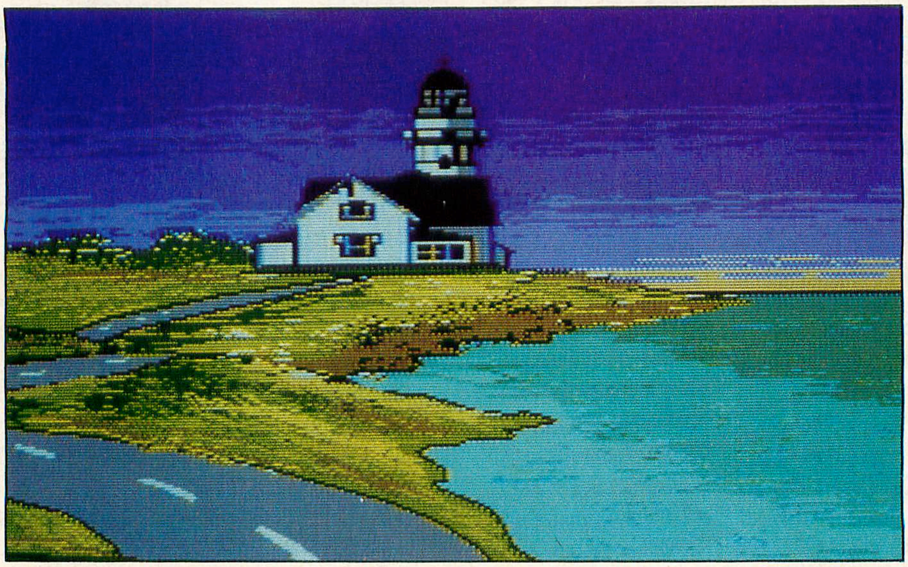
```
1 'CHESS SET
   BY JOEL F. KLEIN
16K ECB, 1 JOYSTICK REQUIRED
ADDRESS CORRESPONDANCE TO
K&R ELECTRONICS,4815 MARRISON
PL., INDPLS.,IN 46226
2 CLS:CLEAR255:PCLEAR4:PMODE4,1:
PCLS1:DIMA$(5),A(.,2),B(8,8),C(1
,15),BT(.,15),WT(.,15):D$="
   "
3 B$="C0BM4,0G2DNG2D6GE2U7BR3D4N
RD3G2EU7ERERDRDRDLG2FRFLFLDLGL2B
R7EU7END7EBF4NRG2D2FNU3FERU4FD3F
BE5BR2LULGND3GD2FRDRE2BF2EU7E2GD
7UE2REBG3RDRDRD"
4 W$="C0BM0,1ERD9FNU9RERNU5RDREU
7END7EBR3DGD8EU6D4E3RDRD4FU4BE4H
EDRBD4HD5GHRU4BEBR3NR5R2NU3D4FNU
9ED2E2BFBR7GL2ULULNU3ENR3U3R3DRD
2"
5 T$="C0BM70,0D9HU4NU3L2R5BD5NGN
LNHEBE2BU2ND5RD6RE3ND2U3RD6REBEB
U3ERD6EU4RURF2BEBRERD6RU5RURF2ND
3RD4REC1"
6 C$="C0BM189,7G3L4ULNU6HU5E3GFD
NGFEUNHEFREBF3D2F2HU4ERFD4NLRNU3
FBFBDEU6NHRD5ERE2UGU2LULBR5NR5R2
NUD4FNU7ED2E2BE3NUD4FNU6RE3ND2U3
RD6REBEBU3ERD6EU4RURF2BF3BR5GL2U
LU2NR3U2LND3ER3DRD2BF4DLUBU2U7RD
7"
7 PRINT@107,"CHESS  SET":PRINT:P
RINT:PRINTD$"BY JOEL F. KLEIN":P
RINT:PRINTD$"   MARCH 1988":PRIN
T:PRINT:PRINT:PRINT"       ONE MOM
ENT, PLEASE ..."
8 FORJ=.TO7:FORK=.TO7:A=-(A=.):C
OLORA:LINE(48+K*20,16+J*20)-(66+
K*20,35+J*20),PSET,BF:NEXT:A=-(A
=.):NEXT:DRAW"C0BM42,12R172NM-6,
+3D168L172U168M+6,+3R160D161L160
NM-5,+4U162":PAINT(212,44),.,.
9 DRAW"C1":LINE(.,.)-(42,11),PSE
T,BF:DRAW"C0BM46,5ENH2U2LURBF3BD
5RDR2EULUL2ULUER2DR":DRAW"XB$;XT
$;":GET(.,.)-(42,10),BT,G:LINE(.
,.)-(42,11),PSET,BF:DRAW"XW$;":G
ET(.,.)-(42,10),WT,G
10 RESTORE:FORJ=.TO5:READA$(J):N
EXT:FORJ=.TO7:READB(J,.),B(J,1),
B(J,6),B(J,7):NEXT:FORJ=.TO7:FOR
K=2TO5:B(J,K)=12:NEXT:NEXT:FORJ=
.TO15:C(.,J)=48+J:C(1,J)=8*((J>7
)-(J<8))+J:NEXT:JN=1:BN=65280
11 FORP=.TO1:FORPN=.TO15:GOSUB30
:NEXT:NEXT:SCREEN1,.:SOUND200,2
12 'MAIN GAME LOOP
13 P=-(P=.):IFP=.THENPUT(.,.)-(4
2,10),WT,PSETELSEPUT(.,.)-(42,10
),BT,PSET
14 GOSUB26:IF(P+1)*6>B(X,Y)ANDP*
6-1<B(X,Y)THENSX=X:SY=Y:GOTO15EL
```

```
SESOUND1,3:GOTO14
15 GOSUB26:IFB(X,Y)>P*6-1ANDB(X,
Y)<P*6+6THENSOUND1,3:GOTO15 ELSE
 DX=X:DY=Y
16 PP=-(P=.):IFB(DX,DY)>PP*6-1AN
DB(X,Y)<PP*6+6THENDRAW"XC$;C1":P
LAY"T3V21L12O3CEGL8O4CL12O3AL4O4
C":LINE(180,.)-(244,11),PSET,BF:
X=DX:Y=DY:PP=P:P=-(P=.):GOSUB31:
P=PP:C(-(P=.),PN)=72:B(DX,DY)=12
17 IFY+P=P*8ANDINT(B(SX,SY)/6)=B
(SX,SY)/6THEN20
18 SOUND150,1:C=-((INT(SX/2)=SX/
2)=(INT(SY/2)=SY/2)):COLORC:LINE
(49+SX*20,16+SY*20)-(66+SX*20,35
+SY*20),PSET,BF:C=-((INT(DX/2)=D
X/2)=(INT(DY/2)=DY/2)):COLORC:LI
NE(49+DX*20,16+DY*20)-(66+DX*20,
35+DY*20),PSET,BF
19 X=SX:Y=SY:GOSUB31:B(DX,DY)=B(
SX,SY):B(SX,SY)=12:C(P,PN)=DX+DY
*8:GOSUB30:GOTO12
20 PLAY"T2V31O3L12DDDP32L2A":CLS
:PRINT@128,D$"  PAWN AT EIGHTH",
D$"RANK.YOU MAY NOW",D$"PROMOTE
 IT TO A",D$"PIECE  OF HIGHER",D
$"VALUE. PRESS ANY",D$"KEY TO DO
 SO.":GOSUB25:CLS:SCREEN1,.
21 FORJ=1TO4:X=2:Y=26+J*20:DRAW"
BM0,0BR=X;BD=Y;C0XA$(J);":PAINT(
X+10,Y+10),-(P=.),.:NEXT
22 J=JOYSTK(.):J=INT(JOYSTK(-2*(
JN=2ANDP=1)+1)/16):H=2:V=46+J*20
:IFPEEK(BN)=126ORPEEK(BN)=254ORP
EEK(BN)=253THEN24
23 GET(H,V+11)-(H+7,V+19),A,G:DR
AW"BM0,0BR=H;BD=V;BRBD18C1E3FEU2
EULGL2GFG3RC0E5GND2L2":PUT(H,V+1
1)-(H+7,V+19),A,PSET:IFPEEK(BN)=
126ORPEEK(BN)=254ORPEEK(BN)=253T
HEN24ELSE22
24 J=J+1:B(SX,SY)=J+P*6:DRAW"C1"
:LINE(.,26)-(21,126),PSET,BF:GOT
O18
25 K$=INKEY$:IFK$=""THEN25ELSERE
TURN
26 X=INT(JOYSTK(-2*(JN=2ANDP=1))
/8):Y=INT(JOYSTK(-2*(JN=2ANDP=1)
+1)/8)
27 H=48+X*20:V=16+Y*20:GET(H,V+1
1)-(H+7,V+19),A,G:DRAW"BM0,0BR=H
;BD=V;BRBD18C1E3FEU2EULGL2GFG3RC
0E5GND2L2"
28 K$=INKEY$:IFK$=""THEN29ELSESO
UND100,1:IFK$="Q"THENCLS:ENDELSE
IFK$="N"THENPUT(H,V+11)-(H+7,V+1
9),A,PSET:GOTO13ELSEIFK$="R"THEN
 7ELSEIFK$="1"THENJN=1ELSEIFK$="2
"THENJN=2ELSESOUND1,1:PUT(H,V+11
)-(H+7,V+19),A,PSET:GOTO27
29 IFPEEK(BN)=126ORPEEK(BN)=254O
RPEEK(BN)=253THENPUT(H,V+11)-(H+
7,V+19),A,PSET:SOUND100,1:RETURN
ELSEJ=X:K=Y:X=INT(JOYSTK(-2*(JN=
2ANDP=1))/8):Y=INT(JOYSTK(-2*(JN
=2ANDP=1)+1)/8):IFX=J ANDY=K THE
N28ELSEPUT(H,V+11)-(H+7,V+19),A,
PSET:GOTO27
30 PO=C(P,PN):Y=INT(PO/8):X=PO-Y
*8:NP=B(X,Y)+6*(P=1):C=-((INT(X/
2)=X/2)=(INT(Y/2)=Y/2)):C=-(C=.)
:X=48+X*20:Y=16+Y*20:DRAW"BM0,0B
R=X;BD=Y;C=C;XA$(NP);":PAINT(X+1
0,Y+10),-(P=.),C:RETURN
31 FORJ=.TO15:IFX+Y*8=C(P,J)THEN
32ELSENEXT:STOP
32 PN=J:FORJ=.TO.:NEXT:RETURN
33 DATA BF6D2F2D5G2DR7UH2U5E2U2H
2L3G,BF2BR3D6R2FD6G2DR7UH2U6ER2U
6DGL2HULDGL2,BF5R2ER2E2FDFD6L2GD
3F2DL7UE2U5HL3HLUER
34 DATA BR9BD2DGDGD3FD5G2DR7UH2U
5EU3HUHU,BR9BD2DG2LGDF3D5G2DR7UH
2U5E3UHLH2U,BR9BD2DG2HD4F2D5G2DR
7UH2U5E2U4GH2U
35 DATA 7,6,0,1,8,6,0,2,9,6,0,3,
10,6,0,4,11,6,0,5,9,6,0,3,8,6,0,
2,7,6,0,1
```

CoCo Cat by Logan Ward


SOMEWHERE UNDER THE RAINBOW . . .
SOFT-WARE'S GREAT . . .
AND I'LL FIND THAT PROGRAM, ONCE IN A BACK ISSUE.

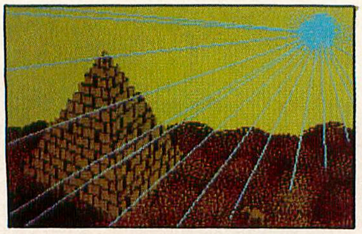
CoCo Gallery



Lighthouse **Brad Bansner**

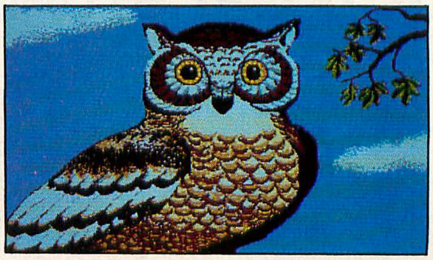
Brad, a high school student in Wyomissing, Pennsylvania, used *Color Max Deluxe* to develop this beautiful scene.

Honorable Mention



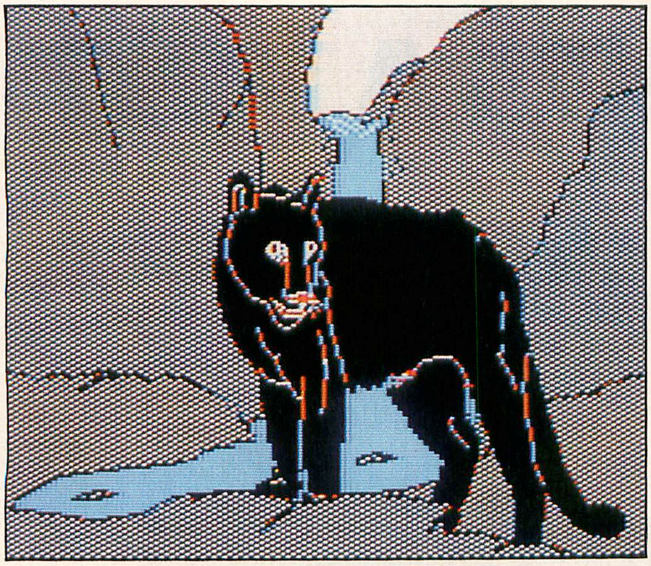
Pyramid **Andrew Wright**

This graphic of an ancient Egyptian tomb was developed with *CoCo Max III*. Andrew lives in Conroe, Texas.



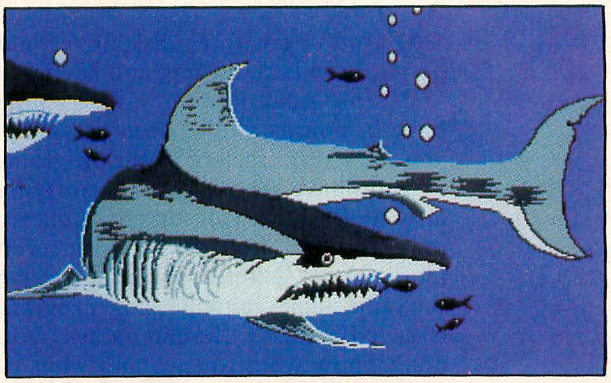
Owl **Wally Mayes**

Wally, of Hamilton, Ohio, used *CoCo Max III* to develop this view of the night bird. Some of his hobbies include archery and guitars.



Panther **Serge Beaudry**

This wild beast was generated with *CoCo Max II*. Serge lives in St-Polycarpe, Quebec, and enjoys many programs, such as *CoCo Max II* and *III*, *Lyra* and *Iron Forest*.



Sharks **Howard C. Rouse**

CoCo Max III was used to create these frightening marine creatures. Howard lives in Ocala, Florida.

SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

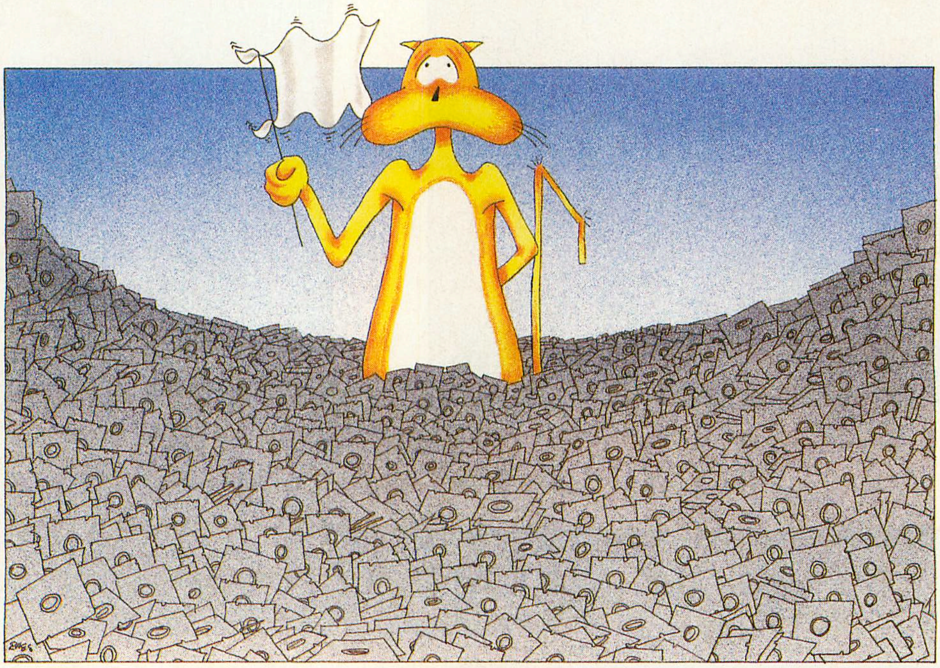
We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

— Angela Kapfhammer, Curator

A program to help you compare disk files for duplicates

COCO TAKES A HINT



By Dennis H. Weide

You've got three disk drives and have been writing and keying in programs like crazy. With all the bulletin boards you've been accessing, you can't keep track of all the programs you now have. About 300 disks are lying around, filled with all sorts of duplicate programs. To confuse the issue even more, many different programs have the same names, and the same program is saved under different names. You don't know what to save and what to erase. Sound familiar? Well, it does to me, so I wrote a program that helps me determine which are duplicate files.

Filecomp is a machine language program that compares disk files much the same as the `COMP` command in the IBM PC and compatibles. It prompts you for two filenames, then reads the files to determine their size. If the files are not the same size, the size of each file will be reported on the screen and the program will end. If the files are the same size, the program compares them byte for byte, counts the number of mismatches between them, and reports the number of mismatches and the size of each file on the screen. If no mismatches are reported, then the file contents are identical.

To use the program, first protect the memory where the *Filecomp* program will load by keying in and entering `CLEAR 200,&H4E20`. Then type `LOADM "FILECOMP"`, press ENTER, type `EXEC` and press ENTER again to load and execute *Filecomp*. Enter the names of the files to be compared at the prompts. The program can compare files on any drive, so you must include the drive number (0 through 3) in the filename even if you only have a one drive system.

Dennis Weide is a communications technician for AT&T in Albuquerque, New Mexico, where he programs AT&T and IBM PCs. He enjoys making toys and teaching computer programming.

The listing: `FILECOMP`

```
PROGRAM FILECOMP(INPUT,OUTPUT);

(* BY DENNIS H. WEIDE *)
(* COMPARE DISK FILES *)
(* TO VERIFY IF THEY  *)
(* ARE EXACT COPIES   *)

VAR FILE1,FILE2:TEXT;
    FILENAME1,FILENAME2:STRING;
    MISMATCH,SIZE1,SIZE2:INTEGER;
    FILECHAR1,FILECHAR2:CHAR;

PROCEDURE FILESIZE(VAR FILETOREAD:STRING;VAR FSIZE:INTEGER);

(* READ FILE SIZE *)

  VAR INFILE:TEXT;
      CHARACTER:CHAR;

  BEGIN
     FSIZE:=0;
     RESET(INFILE,FILETOREAD);
     WHILE NOT EOF(INFILE) DO BEGIN
        READ(INFILE,CHARACTER);
        FSIZE:=SUCC(FSIZE);
     END; (*WHILE*)
  END; (*PROC*)

(* MAIN PROGRAM *)

BEGIN
   SIZE1:=0;
   SIZE2:=0;
   MISMATCH:=0;
   PAGE;
   WRITE('ENTER FILE1 > ');
   READLN(FILENAME1);
   WRITE('ENTER FILE2 > ');
   READLN(FILENAME2);
   WRITELN;
   FILESIZE(FILENAME1,SIZE1);
   FILESIZE(FILENAME2,SIZE2);
   IF SIZE1=SIZE2 THEN BEGIN
     RESET(FILE1,FILENAME1);
     RESET(FILE2,FILENAME2);
     WHILE NOT EOF(FILE1) DO BEGIN
        READ(FILE1,FILECHAR1);
        READ(FILE2,FILECHAR2);
        IF FILECHAR1<>FILECHAR2 THEN MISMATCH:=SUCC(MISMATCH);
     END; (*WHILE*)
     IF MISMATCH=0 THEN
        WRITELN('NO MISMATCHES');
     IF MISMATCH=1 THEN
        WRITELN(MISMATCH,' MISMATCH');
     IF MISMATCH>1 THEN
        WRITELN(MISMATCH,' MISMATCHES');
   END; (*IF*)
   WRITELN;
   WRITELN(FILENAME1,'  ',SIZE1,' BYTES');
   WRITELN(FILENAME2,'  ',SIZE2,' BYTES');
END.
```

Three examples follow, the first comparing the file on Drive 0 to one of the same name on Drive 2:

```
ENTER FILE1 > FILECOMP/BIN:0
ENTER FILE2 > FILECOMP/BIN:2
```

The next example compares two files, with the same name but different extensions, that reside on the same drive:

```
ENTER FILE1 > FILECOMP/BIN:0
ENTER FILE2 > FILECOMP/PAS:0
```

The final example compares two files with different names on different drives:

```
ENTER FILE1 > FILECOMP/BIN:3
ENTER FILE2 > OTHRFILE/BAS:0
```

The program can even compare the same file to itself on the same drive. This is a valid way to check file size.

"Many different programs have the same names, and the same program is saved under different names. You don't know what to save and what to erase. Sound familiar?"

Filecomp was written and compiled using Deft PASCAL *Workbench.* Only one non-standard PASCAL statement was used (`PAGE`) in the program to clear the screen. Therefore, this program can be written using any PASCAL compiler capable of compiling standard PASCAL. It loads and executes at address $4E20 and ends at address $6099. For those of you who have a PASCAL compiler, you can type in the listing and compile it. For those who don't have a compiler, the binary file will appear on this month's RAINBOW ON TAPE and DISK.

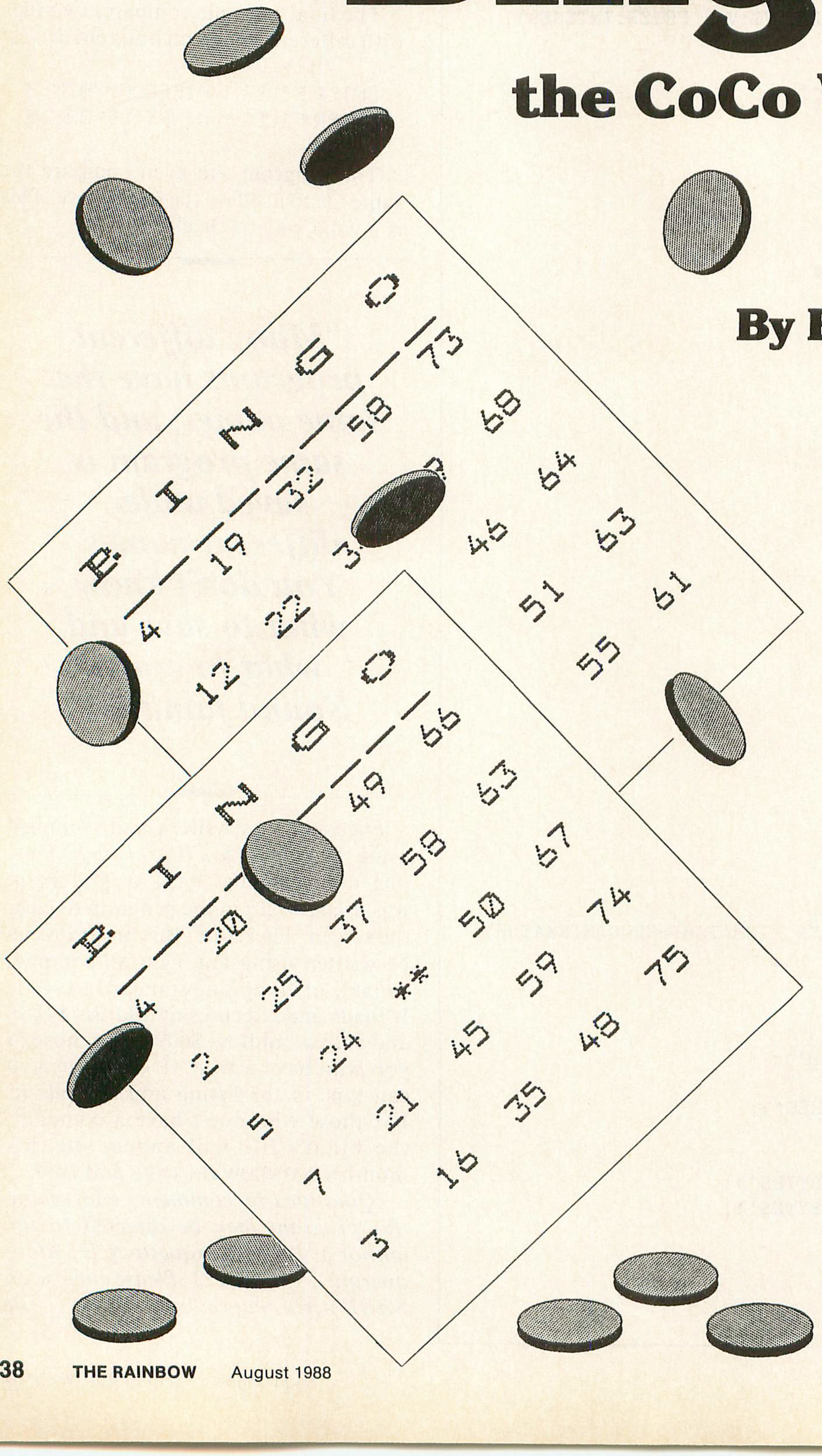
(Questions or comments concerning this program may be directed to the author at 14201 Marquette N.E., Albuquerque, NM 877123. Please enclose an SASE when requesting a reply.)

An old favorite with some added bells and whistles

Bingo

the CoCo Way

By Bruce K. Bell, M.D.


B I N G O
B I N G O

One of my favorite things to do is to take traditional games and adapt them for use with my CoCo. Usually those adaptations include a few enhancements as well. That's what I've done with *Talking Bingo*.

Talking Bingo includes several advantages over a "store-bought" Bingo game or other computer Bingo games I've seen. For example, not only does CoCo select and display the Bingo numbers in bold colorful characters, but it also calls them out. You'll need a Tandy Speech/Sound Cartridge for this. It also constantly displays all the numbers that have been called during the current game. And you needn't go out and buy Bingo cards, because *Talking Bingo* will print out disposable cards for you. If you are alone on a rainy day, CoCo will challenge you to a few quick games. So let's get *Talking Bingo* up and running.

You'll need a CoCo 1, 2, or 3 with at least 16K of memory and Extended Color BASIC. The Tandy Speech/Sound Cartridge is optional, but it's needed if

---

Bruce Bell is an optometric physician who spends hours using programs he finds in RAINBOW and programming his CoCo for home and office use.

you want the numbers called aloud. You'll need an 80-column printer if you want to print your own Bingo cards.

Once you've typed, debugged and saved the program you are ready to run it. On some older CoCos you may get an error after running; if so, just type RUN again.

At the initial menu you are given four choices:

1. Play Bingo
2. Computer Challenge
3. Print Bingo Cards
4. Exit to BASIC

Press the number corresponding to your choice. There may be a momentary delay after you press your choice and before the function is executed. Let's look at these one at a time.

Play Bingo

The screen will clear and the first randomly chosen number will appear in the center of the screen. Simultaneously the number will be called out. A second clock to the right of the screen clicks off ten seconds before the next number is chosen and displayed. After each number is displayed, it will appear in normal Color Computer characters on the screen. You may refer to these at any time during the game.

You've probably also noticed several items at the bottom of the screen. These are to remind you that you may at any time during the game press M to end the game and return to the menu, or press T to toggle between enabling and disabling the Speech/Sound Cartridge's speech capabilities. You may also press P to pause in the game. This is useful if you want to go back and compare your cards to those numbers already called. When you "Bingo," press B; you will be prompted to enter the five numbers you've used to do so. Press F if one of the numbers is the free space. Enter your numbers by typing the letter followed by the number: for example, B3 or O71. If you enter a number that has not been called, a series of question marks appear, requesting you to reenter. Press M to end the game and return to the menu, or C to continue the same game where you left off.

After you've Bingoed and won the game, press M to return to the menu or C to continue where you left off. This allows you to have a second-place Bingo card.

Line Number	Description
000-010	Initialize program
100-120	Main Menu
200-250	Randomly select Bingo numbers
300-350	Input numbers for Bingo
400-480	CoCo creates and plays its cards
500-525	Print Bingo cards
600-620	Create Bingo cards
700	Ends game
800-855	Speech routine
900-945	Subroutines
1000-1070	Data
1100	Clears memory

Table 1

Computer Challenge

This option operates exactly the same as Play Bingo, except that CoCo also selects three cards and plays against you. Don't worry! CoCo won't cheat! After you have selected this option, there is a momentary pause while CoCo creates its three cards. Then the game begins, played as above with the following differences: When you select Menu,

CINSOFT
PROGRAMS • PERIPHERALS • SUPPLIES • SERVICE

Fast Delivery...
Friendly Service

Now in our 6th year!

Avatex Modems

SUPER VALUE! SUPER SPEED!

Avatex 1200e	$ 99
with Coco Cable	109
Avatex 2400	$219
with Coco Cable (Coco 3 only)	229
with RS-232 Cable*	245

Reviewed in April, 1988 Rainbow!

RAINBOW CERTIFICATION SEAL

Avatex 1200e, Cable AUTOTERM ... $139

Avatex 2400, Cable AUTOTERM ... $259

*Coco 1, 2 requires Deluxe RS-232 Pak

• Call •
513-396-SOFT

• Shop by Modem •
513-396-SHOP

VISA MasterCard AMERICAN EXPRESS

2235 Losantiville, Cincinnati, OH 45237
SHIPPING will be charged at our ACTUAL COST
Ohio residents add 5.5% Sales Tax COD add 2.50

TANDY COMPUTER DISCOUNTS

COLOR COMPUTERS

26-3334 CoCo 3	165.00
26-3215 CM-8 color monitor	259.95

PRINTERS

26-2802 DMP 106	179.95
26-2808 DMP 440	599.00
26-1280 DMP-130	279.00

Complete line of Tandy (Daisy Wheel) print wheels

MSDOS COMPUTERS

25-1053 TANDY 1000 HX	599.00
25-1600 TANDY 1000 TX	999.95
25-4071 TANDY 3000 HL	1,300.00
25-1023 CM-5 color monitor	249.95
25-1020 VM-4 Monochrome monitor	110.00

We Carry the Complete Line of Tandy Computer Products at Discount Prices

CALL FOR A FREE PRICE LIST 800-257-5556
IN N.J. CALL 609-769-0551

WOODSTOWN ELECTRONICS
Rt. 40 E. WOODSTOWN, N.J. 08098

Bingo, Pause, or Talk, there is a pause before the function is executed. This is because CoCo may be checking its cards when you press the key. CoCo doesn't forget; it just finishes checking its cards before carrying out your command.

When CoCo Bingos, its winning card appears in the center of the screen. Called numbers appear in reverse characters, and the winning row is marked in red. You may now return to the Menu and continue the same game or, by pressing V, see all three of CoCo's cards. This is the only time you may see them. Note that if CoCo has won the game and you choose to continue play, CoCo does not continue with you — it stops playing.

Print Bingo Cards

The cards created in *Talking Bingo* are printed on standard paper in four rows of three cards, or 12 cards per page. The idea is that each player plays with three cards at a time and marks with a pen or pencil the numbers on his cards as they are called. After selecting this option, you are asked for the number of rows of cards you want to print. Remember that there are four rows per page. Set the top edge of your paper at the print-head and follow the prompts from here.

I have a DMP 200 and CGP-220, both of which use `CHR$(27)CHR$(14)` to call expanded print and `CHR$(27)CHR$(15)` to recall normal print. If your printer is different, you will need to change lines 515 and 525 accordingly.

Exit to BASIC

This, of course, returns you to BASIC but does not erase the program from memory.

One final note about the Speech/Sound Cartridge. If you don't have one, no modifications are necessary. Just type in the program as it is and run it. You may, however, want to toggle the Talk function (by pressing T) to enable the alternate "beeps" that alert you when a new number appears.

I hope you enjoy playing and studying *Talking Bingo*. Table 1 includes a breakdown description of each of the program modules within the program. Let me know if I can be of any help.

(Questions or comments regarding this program may be addressed to the author at 137 Samanda Circle, Rockmart, GA 30153. Please enclose an SASE when requesting a reply.) ☐

120	81	525	144
305	160	850	59
345	19	1000	112
450	112	END	230

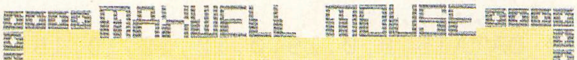
The listing: BINGOTLK

```
0 'BINGO 2.0; <C> BRUCE BELL 198
6,87; 16KECB; this program is no
nwarranted!!!
5 POKE3584,0:IFPEEK(33021)=50THE
NWIDTH32:POKE3584,2
10 FORK=1TO8:PRINT,"BINGO",,"bin
go",:NEXT:GOTO1100
100 POKE65495+PEEK(3584),0:PRINT
@0,CHR$(181)" ONE MOMENT "CHR$(1
86);:CLEAR550:DIML$(14),N$(15),A
(75),B(2,4,5):R=RND(-TIMER):M1=&
HFF00:M2=&HFF7E:GOSUB920:DEF FNL
(N)=INT(ABS(N-1)/15)+1
105 FORK=1TO14:FORX=1TO15:READD:
L$(K)=L$(K)+RIGHT$(STR$(D),2):NE
XTX,K:FORK=0TO15:READN$(K):NEXT:
POKE65494+PEEK(3584),0
110 CLS0:FORK=0TO63:SET(K,2,4):S
ET(K,11,4):NEXT:R=32:L$="TALKING
 BINGO   BY BRUCE   BELLL":PRINT@
19,"by";CHR$(128)"bruce"CHR$(128
)"bell";:GOSUB850:GOSUB900:FORK=
1TO75:A(K)=0:NEXT:Z=0:F=0
115 PRINT@224,TAB(6)"1. PLAY BIN
GO"TAB(38)"2. COMPUTER CHALLENGE
"TAB(38)"3. PRINT BINGO CARDS"TA
B(38)"4. EXIT TO BASIC":L$="WHAT
 IS YOUR PLEASURE?":PRINT@388,L$
;:GOSUB850
120 GOSUB910:CH=Q:ONQ GOTO200,40
0,500,700:R=RND(7)*16:GOSUB900:G
OTO120
200 L$="GGET READY":GOSUB850:CLS
0:L$="bingo":GOSUB915:GOSUB925
205 IFQ$="B"THEN300ELSEN=RND(75)
:IFA(N)>0THEN205ELSER=RND(6)*16:
L=FNL(N)
210 P=200:L$=L$(L):GOSUB905:R=R+
16:N$=RIGHT$(STR$(N),2)
215 FORK=1TOLEN(N$):X$=MID$(N$,K
,1):IFX$=" "THENL$=""ELSEL$=L$(V
AL(X$)+5)
220 P=200+6*K:GOSUB905:NEXTK
225 TIMER=0:TALK=1:IFT=0GOSUB800
ELSESOUND100,1
230 IFCH=2THEN410
235 GOSUB910:GOSUB930:IFDLAY=5AN
DTALK=1GOSUB800:TALK=0:GOTO235EL
SEIFDLAY THEN235
240 PRINT@Z,MID$("BINGO",L,1);RI
GHT$(STR$(N),2);CHR$(128);
245 A(N)=Z+3:Z=Z+4:IFZ=160THENZ=
320
250 GOTO205
300 IFWV GOSUB465:GOTO330ELSEPRI
NT@251,"bingo";:GOSUB945:PRINT@4
81," M=MENU   F=FREE   C=CONTINU
E ";
305 FORK=0TO4:P=197+K*16:PRINT@P
,"";:INPUTQ$
310 PRINT@219+INT(K/2)*32,"bingo
";:IFQ$="M"THENK=5:NEXT:GOTO100
315 IFQ$="C"THENK=5:NEXT:GOSUB94
5:GOSUB925:F=0:FORK=1TO75:IFA(K)
>1000THENA(K)=A(K)-1000:PRINT@A(
K),CHR$(128);:NEXT:GOTO205ELSENE
XT:GOTO205
320 IFQ$="F"THENIFF=1THEN345ELSE
```

```
F=1:NEXTK:GOTO330
325 N=VAL(MID$(Q$,2)):IFA(N)=0OR
A(N)>1000THEN345ELSEPRINT@A(N),C
HR$(127);:A(N)=1000+A(N):IFT THE
NSOUND200,1:NEXTK ELSEL$="CHECK"
:GOSUB850:NEXTK
330 PRINT@480,STRING$(31,128);:P
RINT@480,"GAME OVER! mENU cONTIN
UE";:L$="BINGO":GOSUB850:IFCH=2T
HENPRINT" vERIFY";
335 GOSUB910:L$="BINGO":GOSUB915
:L$="bingo":GOSUB915:IFQ$="C"THE
NPRINT@165,STRING$(22,128);:PRIN
T@293,STRING$(22,128);:CH=2-WV:W
V=0:FORK=3TO4:GOTO315ELSEIFCH=2
AND Q$="V"THENUU=U:FORU=0TO2:GOS
UB465:PRINT@480,"  CARD"U+1":
 PRESS <ENTER>    "; ELSE335
340 GOSUB910:IFQ$=""THEN340ELSEN
EXTU:U=UU:IFU=3GOSUB945:GOTO330E
LSEGOSUB465:GOTO330
345 PRINT@P,"?????";:IFT THENSOU
ND1,5 ELSEL$="PLEASE RE ENTER":G
OSUB850
350 K=K-1:NEXTK
400 L$=" ONE MOMENT PLEASE... ":
PRINT@388,L$;:GOSUB850:GOTO600
405 FORK=0TO75:A(K)=0:NEXT:GOTO2
00
410 FORK=0TO2:FORC=0TO4:FORR=0TO
4:IFB(K,C,R)=N THENB(K,C,R)=B(K,
C,R)+500
415 GOSUB930:IFDLAY=5ANDTALK=1GO
SUB800:TALK=0
420 NEXTR,C,K:GOSUB910
425 WV=0:FORU=0TO2:FORC=0TO4:W=0
:V=0:FORR=0TO4:IFB(U,C,R)>499THE
NW=W+1
430 IFB(U,R,C)>499THENV=V+1
435 NEXTR:GOSUB930:IFW=5THENFORR
=0TO4:B(U,C,R)=B(U,C,R)+500:NEXT
R:C=4:NEXTC:GOTO460ELSEIFV=5THEN
FORR=0TO4:B(U,R,C)=B(U,R,C)+500:
NEXTR:C=4:NEXTC:GOTO460ELSENEXTC
440 R=4:W=0:V=0:FORC=0TO4:IFB(U,
C,C)>499THENW=W+1
445 IFB(U,C,R)>499THENV=V+1
450 R=R-1:NEXTC:GOSUB930:IFW=5TH
ENFORC=0TO4:B(U,C,C)=B(U,C,C)+50
0:NEXTC:GOTO460ELSEIFV=5THENR=4:
FORC=0TO4:B(U,C,R)=B(U,C,R)+500:
R=R-1:NEXTC:GOTO460
455 NEXTU:GOTO235
460 WV=5:Q$="B":GOTO240
465 GOSUB945:FORP=165TO293STEP32
:PRINT@P,CHR$(165)STRING$(20,32)
CHR$(170);:NEXT:FORR=0TO4:P=166+
R*32:FORC=0TO4:IFB(U,C,R)>999THE
```

Mouse Tales

By Logan Ward


MAXWELL MOUSE
I SURE LIKE TO PAINT WITH MY COCO, GUESS THAT MAKES ME A ORTIST !

CocoTech

NEW

ULTIMAX

You can use UltiMax as a normal HI-REZ joystick interface or switch it to be used with a popular Max III graphics program. The other feature of UltiMax is the option to have a large or small stick area so you can be more accurate with your drawings!

The UltiMax interface is only $29.95

Or trade in your original HiRes interface (sent postage prepaid) and get UltiMax for only.............$14.95

MACPLAY

With **MACPLAY** and a CoCo 3 you can play MAC sound files (Included on the second diskette) with pure 6 BIT sound quality that the CoCo can produce! Or download other MAC sound files from a computer information service or MAC bulletin board systems to hear even more. Sound files can last for a few seconds or up to 1/2 minute. MAC sound files included on the second diskette contain excerpts from the 3 Stooges to the Road Runnner and more!!

MACPLAY is only..........$ 19.95

Please make check or money order payable to: Thomas E. Keller

Send to:
CocoTech
208 Cathy Ann Drive
Reading, PA 19606
(215)-779-7768

PA residents add 6% sales tax

Please allow 1 to 3 weeks for delivery

Shipping and handling:
USA and Canada add $2.50
Other countries add $5.00

Sorry no credit cards **YET!**

** We now handle C.O.D.'s **

```
NB=B(U,C,R)-1000:D=2ELSEIFB(U,C,
R)>499THENB=B(U,C,R)-500:D=1ELSE
B=B(U,C,R):D=0
470 IFD=0THENB$="BINGO"ELSEB$="b
ingo":IFD=2THENPRINT@P,CHR$(186)
;:IFB THENPRINT@A(B),CHR$(127);
475 IFB=0THENPRINT@P+1,"fre";ELS
EPRINT@P+1,USINGMID$(B$,FNL(B),1
)+"##";B;:IFD THENFORK=1TO2:POKE
1025+P+K,PEEK(1025+P+K)-64:NEXT
480 P=P+4:NEXTC,R:RETURN
500 PRINT@386,"HOW MANY ROWS OF
CARDS";:INPUTQ
505 PRINT@416,"PREPARE PRINTER A
ND PRESS enter";:INPUTQ$:IF(PEEK
(65314)AND1)=1THENPRINT@416,"PRI
NTER IS NOT READY!!!":SOUND100,1
:FORZ=1TO1000:NEXT:GOTO505
510 FORZ=1TOQ:PRINT#-2:PRINT#-2:
FORK=1TO75:A(K)=0:NEXTK
515 PRINT#-2,CHR$(27)CHR$(14);:'
call expanded print mode (DMP200
)
520 FORK=1TO3:PRINT#-2,"  B I N
G O  ";:NEXT:PRINT#-2
525 FORK=1TO3:PRINT#-2,"  ______
___  ";:NEXT:PRINT#-2,CHR$(27)CH
R$(15):'cancel expanded print mo
de (DMP200)
600 FORR=0TO4:FORK=0TO2:FORC=0TO
4
605 N=RND(15)+15*C:X=2^K:IF(A(N)
ANDX)<>0 THEN605ELSEA(N)=(A(N)OR
X):IFR=2ANDC=2THENIFCH=2THENB(K,
C,R)=500:NEXTC ELSEPRINT#-2,TAB(
K*26+12)"**";:NEXTC
610 IFCH=2THENB(K,C,R)=N:NEXTC,K
,R:GOTO405ELSEPRINT#-2,TAB(K*26+
C*4+3)N;:NEXTC,K:PRINT#-2:PRINT#
-2:NEXTR
615 PRINT#-2:PRINT#-2:IFZ/4=INT(
Z/4)THENPRINT#-2:PRINT#-2
620 NEXTZ:GOTO100
700 CLSRND(8):L$="SO LONG!":PRIN
TL$:GOSUB850:END
800 L$=MID$("BINGO",L,1)+" ":IFN
<10THENL$=L$+STR$(N)ELSEIFN<21TH
ENL$=L$+N$(N-10)ELSEIFN/10=INT(N
/10)THENL$=L$+N$(N/10+8)ELSEL$=L
$+N$(INT(N/10)+8)+RIGHT$(STR$(N)
,1)
850 IFT THENRETURNELSEL$=L$+" "+
CHR$(13):FORY=1TOLEN(L$)
855 IFPEEK(M2) AND 128=0 THEN855
ELSEPOKEM2,ASC(MID$(L$,Y,1)):NEX
T
860 RETURN
900 FORA=1TO5:P=59+6*A:L$=L$(A):
GOSUB905:NEXTA:RETURN
905 FORB=1TO21STEP10:PRINT@P,"";
:FORC=0TO9STEP2:PRINTCHR$(R+128+
VAL(MID$(L$,B+C,2)));:NEXTC:P=P+
32:NEXTB:RETURN
910 Q$=INKEY$:IFQ$="M"THEN100 EL
SEIFQ$="T"THENT=(T+1)AND1:PRINT@
507,CHR$(84+T*32);:GOSUB920:RETU
RNELSEIFQ$="P"THEN935ELSEIFQ$<>"
B"THENQ=VAL(Q$):RETURNELSEIFCH T
HEN240ELSERETURN
915 FORK=0TO2:PRINT@192+K*32,L$;
:PRINT@219+K*32,L$;:NEXT:RETURN
920 POKE&HFF7D,1:POKE&HFF7D,0:PO
KEM1+1,52:POKEM1+3,63:POKEM1+35,
60:RETURN
925 PRINT@480,CHR$(128);"Menu";S
TRING$(4,128);"Bingo";STRING$(4,
128);"Pause";STRING$(4,128);"Tal
k";:IFT THENPRINT@507,"t";:RETUR
NELSERETURN
930 DLAY=10-INT(TIMER/60):PRINT@
251,RIGHT$(STR$(DLAY),2)"SEC";:R
ETURN
935 TI=TIMER:PRINT@481,"   PRESS
 ANY KEY TO CONTINUE  ";
940 IFINKEY$=""THEN940ELSETIMER=
TI:GOTO925
945 FORK=197TO261STEP32:PRINT@K,
STRING$(22,128);:NEXT:RETURN
1000 DATA15,12,12,15,0,15,12,12,
12,15,15,3,3,3,15
1005 DATA4,12,15,12,8,0,0,15,0,0
,1,3,15,3,2
1010 DATA15,9,0,0,15,15,0,9,0,15
,15,0,0,9,15
1015 DATA15,12,12,12,8,15,0,1,3,
3,15,3,3,3,7
1020 DATA15,12,12,12,15,15,0,0,0
,15,15,3,3,3,15
1025 DATA0,1,15,0,0,0,0,15,0,0,0
,3,15,3,0
1030 DATA0,4,12,12,15,15,12,12,1
2,12,15,3,3,3,3
1035 DATA12,12,12,15,0,0,4,12,12
,15,3,3,3,3,15
1040 DATA15,0,0,15,0,12,12,12,15
,12,0,0,0,15,0
1045 DATA15,12,12,0,0,12,12,12,1
2,15,3,3,3,3,15
1050 DATA15,12,12,0,0,15,12,12,1
2,15,15,3,3,3,15
1055 DATA0,12,12,12,10,0,0,0,6,0
,0,0,6,0,0
1060 DATA0,15,12,15,0,15,12,12,1
2,15,15,3,3,3,15
1065 DATA15,12,12,12,15,12,12,12
,12,15,0,0,0,0,15
1070 DATATENN,EELLEVEN,TWELLVE,T
HHIRTEEN,FORTEEN,FFIFTEEN,SSIXTE
EN,SSEVENTEEN,EIGHT TEEN,NINE TE
EN,TWENTEE,THIRTEE,FORTEE,FIFTEE
,SSIXTEE,SSEVENTEE
1100 PCLEAR1:GOTO100
```

Get 2 Free Hours *
Sign-Up Today!

Retrieve more online for less with GEnie.™

“I've really tracked down superior selection and service with GEnie. I always knew GEnie was ahead of the pack with the Tandy† RoundTable™ Special Interest Group, featuring over 2500 software files, dynamic bulletin boards, lively discussions and “tips” from the experts. And now I can sink my teeth into valuable information services like American Airlines EAASY SABRE™ personal reservation system, discount shopping with Comp-u-store Online,® new and exciting multi-player games and access to Dow Jones News/Retrieval.® And those GEnie people are so dog-gone friendly!

You're barking up the wrong tree if you don't look to GEnie for value, service and selection for your Tandy. Only GEnie offers you so much online, for less.”

B. A. Retriever

Services Available	Compare & Save	Pricing**			
		Registration Fee	Monthly Minimum	Non-prime Time Rates	
				300 baud	1200 baud
Electronic Mail • CB • SIGs/User Groups • Travel • Shopping • Finance • Reference Professional • Leisure • Games • News	**GEnie†**	**$29.95**	**None**	**$5.00**	**$5.00**
	CompuServe	$39.95	None	$6.00	$12.50
	Other	$49.95	$10.00	$8.40	$10.80

**Get 2 Free Hours with Sign-Up.*

Still just $5 per hour. Get online today!

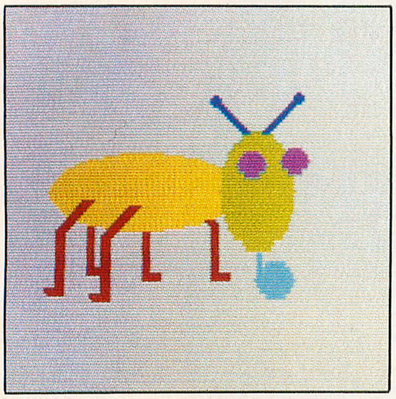
1. Have your major credit card or checking account number ready.
2. Set your modem for local echo (half duplex)—300 or 1200 baud.
3. Dial 1-800-638-8369. When connected, enter HHH
4. At the U#= prompt enter **XJM1772 ,GEnie** then RETURN.

Need help or more information? No modem yet? We can help. In U.S. or Canada call **1-800-638-9636** or write GEnie,
401 N. Washington Street, Rockville, MD 20850.

We bring good things to life.

**Basic rates and services in effect 1/88 apply in U.S. only. †Non-prime time rates apply Mon.-Fri. 6PM-8AM local time and all day Sat., Sun., and nat'l. holidays. Subject to service availability. Some services offered on GEnie may include additional charges. Dow Jones News Retrieval is a registered service mark of Dow Jones & Co., Inc. †Tandy is a registered trademark of Tandy Corporation. *$10 credit applies. Offer good for 30 days from sign-up.

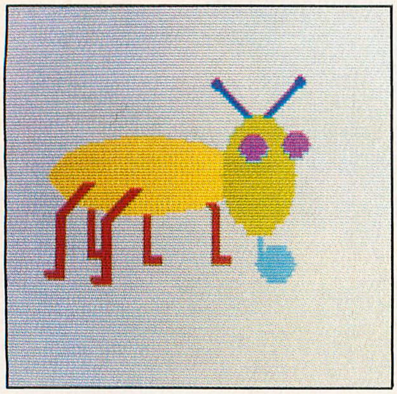
© 1988 General Electric Company, U.S.A.

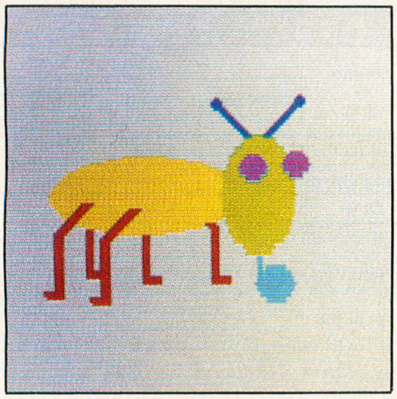


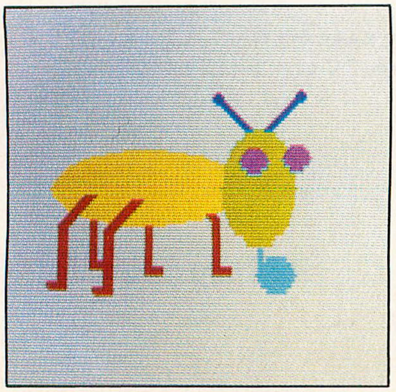
You won't even lose any pieces

Child's Play

By Bill Bernico







I remember, as a kid, playing a dice game where the players each got 13 plastic bug parts and shook a die, trying to assemble their own bug first. The problem with that game was that someone kept losing the plastic bug parts, and there never seemed to be enough legs or feelers to go around. When playing *Buggie*, the computer can't lose the pieces. They're always there, safe in CoCo's memory, ready to play.

I should explain the value of the die for you *Buggie* novices. Rolling a one gets you a body. Two is good for a head. Roll a three for eyes (you need two). A four gives you a feeler (again, you need two). Rolling a five allows you to add the tongue. You will need to roll a six a total of 6 times, one for each leg that you will add to your bug. There are 13 parts in all. Once you have all 13, you win. To "roll" the die, simply press any key when your name appears at the top of the screen. It sounds easy — too easy.

Here is the catch.

If you roll a one, you can begin with the body. No other number on the die has any value until a one is rolled. After all, you can't add a head, eyes, feelers, legs or a tongue unless you first have a body to put them on.

Once you have rolled a one, you can get credit for any sixes you roll, adding a leg for each six. Numbers three, four and five are still worthless until you roll a two, which will give you the bug's head. Three, four and five represent eyes, feelers and tongue, in that order. You can't add them unless you first have a head, can you?

All right, so now you have a body (one) and a head (two). From this point, any other number, in any order, will add to your bug. If you roll a number you don't need or can't use, simply pass the die and let the next player try for another piece. That's all there is to it. Have fun!

(Questions or comments concerning this program may be directed to the author at 708 Michigan Avenue, Sheboygan, WI 53081. Please enclose an SASE when requesting a reply.) ☐

Bill Bernico is the author of over 200 Color Computer programs and is a frequent RAINBOW contributor whose hobbies include golf, writing music and programming. Bill is a drummer in a rock band and lives in Sheboygan, Wisconsin.

```
9 .......191  98 .......234
30 ........95  110 ......157
53..........0  120 .......68
75 ........25  END .....102
```

The listing: BUGGIE

```
1 'COCO BUGGIE (C) 1988 FROM
   BILL BERNICO SOFTWARE

2 CLEAR500:CLS0:PRINTTAB(10)"COC
O-BUGGIE":FORX=1024TO1055:POKEX,
PEEK(X)-64:NEXTX:PRINT:PRINT"PLA
YER'S NAME MUST BE LESS THAN EIG
HT CHARACTERS EACH":PRINT:INPUT"
PLAYER 1'S NAME";N1$:IFLEN(N1$)>
8THEN2
3 PRINT@192,STRING$(32,143):PRIN
T@224,STRING$(32,143):PRINT@224,
"";:INPUT"PLAYER 2'S NAME";N2$:I
FLEN(N2$)>8THEN3
4 POKE65497,0:RGB:HSCREEN2:HCLS4
:HCOLOR8,4:ONBRKGOTO131:DT$="RDL
U2R2D3L3U3F":D$="BL4BUR22D22L22U
22E4R22NG4D22NG4U22L22G4BF3":LR$
="G10D20L4DR5U21E10RG10D20L5DNR6
DR6U22E10RG10
5 HCLS4:HLINE(0,0)-(160,191),PSE
T,B:HLINE(5,5)-(155,186),PSET,B:
HPAINT(2,2),2,8:HLINE(160,0)-(31
9,191),PSET,B:HLINE(165,5)-(314,
186),PSET,B:HPAINT(167,2),3,8
6 IFP2=13THEN100ELSEGOSUB113:D=R
ND(6):HCOLOR2:PLAY"O2T20B":HPRIN
T(1,1),N1$+",HIT A KEY":EXEC4453
9:HDRAW"BM30,27"+D$:Z=D:GOSUB106
:PLAY"O4T60CBDAEGFC
7 ON Z GOTO 8,12,18,26,34,40
8 HPRINT(10,4),"1=BODY
9 IFB1=1THEN11
10 IFB1=0THEN X=87:Y=93:H=60:GOS
UB114:B1=1:P1=P1+1:GOTO52
11 GOSUB127:GOTO52
12 HPRINT(10,4),"2=HEAD
13 IFH1=1THEN16
14 IFB1=0THEN17
15 IFH1=0THEN H=100:GOSUB115:H1=
1:P1=P1+1:GOTO52
16 GOSUB127:GOTO52
17 HPRINT(3,21),"YOU NEED A BODY
":GOTO52
18 HPRINT(10,4),"3=EYES
19 IFH1=0THEN24
20 IFE1=2THEN25
21 IFE1=0THEN H=113:GOSUB116
22 IFE1=1THEN H=98:GOSUB117:P1=P
1+2
```

FILE TRANSFER UTILITIES

You asked for it at the Chicago RainbowFest -

FILE TRANSFER UTILITIES NOW HANDLE RSDOS DISKS!

Need to transfer text files to and from PC (MSDOS), RSDOS and FLEX disks into your CoCo (OS-9) system? Have text files on a PC (MSDOS) system at work and want to work on them at home on your CoCo?

With GCS File Transfer Utilities you just place the PC (MSDOS), RSDOS or FLEX disk into your CoCo disk drive - enter a simple command and the file is copied into a CoCo OS-9 file. File transfer back to PC (MSDOS), RSDOS and FLEX disks is just as simple.

PCDIR	directory of PC disk	**RSDIR**	directory of RSDOS disk
PCDUMP	display PC disk sector	**RSDUMP**	display RSDOS disk sector
PCREAD	read PC file	**RSREAD**	read file from RSDOS disk
PCWRITE	write file to PC disk	**RSWRITE**	write file to RSDOS disk
PCRENAME	rename PC file	**FLEXDIR**	directory of FLEX disk
PCDELETE	delete PC file	**FLEXDUMP**	display FLEX disk sector
PCFORMAT	format PC disk	**FLEXREAD**	read FLEX file
		FLEXWRITE	write file to FLEX disk

Extensive Options Single, double sided disks. 40 or 80 track floppy drives. 8 or 9 sectors. First level sub-directories - PC (MSDOS). FLEX transfers binary files also.

Requires OS-9 (Level 2 for MultiVue), 2 drives (one can be hard), MultiVue for MultiVue version, SDISK (SDISK3 for MultiVue) - see D.P. Johnson ad for SDISK

GSC File Transfer Utilities for CoCo - MultiVue version $54.95

GSC File Transfer Utilities for CoCo - Standard version $44.95

All diskettes are **CoCo OS-9** format. Orders must be prepaid or COD, VISA/MC accepted, add $1.50 S&H, additional charge for COD.

GRANITE COMPUTER SYSTEMS
Route 2 Box 445 Hillsboro, N.H. 03244
(603) 464-3850

RAINBOW CERTIFICATION SEAL

OS-9 is a trademark of Microware Systems Corporation and Motorola Inc.
MS-DOS is a trademark of Microsoft Corp. FLEX is a trademark of TSC, Inc.

As EASY As WRITING A CHECK

THAT'S HOW EASY IT IS TO:

- RECONCILE YOUR CHECK BOOK
- USE A BUDGET
- KEEP TRACK OF CASH EXPENSES
- TRACK CHECK, ATM & CASH EXPENSES BY TYPE OR PAYEE
- SUMMARIZE YOUR EXPENSES FOR TAX TIME - OR FOR ANY OTHER PURPOSE

RAINBOW CERTIFICATION SEAL

GREAT DOCUMENTATION
ON SCREEN MENU'S & PROMPTS
DEFINATELY USER FRIENDLY
REQUIRES 32K CoCo 1, 2, or 3 AND SINGLE DISK DRIVE
REVIEWED IN DECEMBER' 87 RAINBOW

THE CoCo CHECKBOOK -
$25.00 + $2.50 shipping and handling

PROGRAMS for PEOPLE from

BOB'S SOFTWARE
P.O. Box 391 Cleveland, Ohio
44107-0391

Frank Hogg Laboratory

12 Years of Service, Support, and Friendly Help!

DISCOU ICE LIST

NEW LOWER PRICES!!

CoCo Burke & Burke Hard Drive Kits

FLASH!** More Burke and Burke systems have been bought in the last six months than other systems have sold in the last **3 years!!!!

Our first system features the Burke & Burke XT or XT RTC interface. This interface uses popular and inexpensive IBM PC type controllers. For this reason it is the least expensive hard disk system available today. Not as fast as the Isted system but faster than any other system available. It also supports RLL drives. **Note:** Disk Extended Color Basic support and other software options are listed on our price list.
Disadvantage; requires a multi-pak.

KIT INCLUDES: Burke & Burke (B&B) XT PC interface. Hard drive with controller, 3 foot ST506 cable set. Hard Drive Case with 60 watt power supply and **fan**. Includes OS9 LI and LII software. 1 megabyte transfer in 45 seconds! Type ahead under OS9. Complete instructions. Easy one evening assembly.

NEW LOWER PRICES!!

1 YEAR WARRANTY ON ALL SYSTEMS!

20 Meg Kit Complete 60MS	*498.00
30 Meg Kit Complete 60MS RLL	*548.00
40 Meg Kit Complete 60MS	*618.00
Assemble and test any of the above add	50.00
OPTIONS:	
B&B Real Time Clock (add to above)	30.00
B&B XT ROM Auto Boot from hard disk	19.95
B&B Hyper I/O run DECB on hard drive	29.95
B&B Hyper III Ramdisk/spooler for above	19.95
FBU Fast Hard disk Back Up	75.00

Hard Drive Bits and Pieces

NEW LOWER PRICES!!

B&B XT PC style interface	69.95
B&B XT RTC interface w/clock/calendar (Call for Hard Drive and Kit prices)	99.95
FHL HCA/WD High Speed Interface	*99.95
WD 1002-05 High Speed for FHL Interface (Supports both Hard and Floppy drives) (Call for Hard Drive prices)	*196.00
Hard Drive case with 60W P/S and Fan (Can also be used for floppy drives)	*98.00

SPECIFICATIONS: size 16" deep, 5.5" high, 7" wide. 60 Watt power supply with 3 drive type power connectors, quiet 12 volt DC fan, LED power indicator, color matches CoCo. Holds 2 1/2 height hard or floppy drives and has card guided space for a PCB the size of a drive (like the WD1002-05 controller)

Floppy Drives (5.25" and 3.5" FLOPPY DISKS)

TEAC High Quality Drives - 1 Year Warr.

FD55B 360K 40 Track DS 5.25"	118.00
FD55F 720K 80 Track DS 5.25:	151.00
FD35F 720K 80 Track DS 3.5"	147.00

(Bare drives, requires case and power supply $75.00)

CoCo FHL High Speed Hard Drive Kits

Our top of the line system features Bruce Isted's interface for the Western Digital WD 1002-05 high speed controller. **Features**; fastest system available, 1 megabyte transfer in only 37 seconds!! Twice as fast as other systems! Supports 4 floppy and 3 hard drives, type ahead for **both** floppy and hard disk, **autoboot OS9** L1 or L2 from hard or floppy disk. **Disadvantage**; does not support DECB. This is *the* system of choice for the serious OS9 user.

KIT INCLUDES: FHL HCA/WD High Speed interface, Hard drive with WD 1002-05 controller, ST506 cable set, 4 foot 40 pin cable, Hard Drive Case with 60 watt power supply and **fan**, OS9 software for LI and LII with source, Complete instructions. Easy one evening assembly.
(INTERFACE SPECIFICATIONS: Size is the same as a floppy controller. Interfaces the WD 1002-05 controller to the CoCo. This controller handles 3 hard and 4 floppy drives. Type ahead under OS9 for both floppy and hard drive. Includes OS9 LI and LII software with source. Autoboot ROM included to boot from floppy or hard drive. Supports OS9 only. 1 megabyte transfer in 37 seconds!)

1 YEAR WARRANTY ON ALL SYSTEMS!

NEW LOWER PRICES!!

20 Meg High Speed Kit Complete	*725.00
40 Meg High Speed Kit Complete	*825.00
70 Meg High Speed Kit Complete	1260.00
Assemble & Test any of the above add	60.00
OPTIONS:	
Floppy Drive (Mounted in case)	128.00
FBU Fast Hard disk Back Up	75.00

ORDERING INFORMATION VISA and M/C. NY residents add 7% sales tax. US shipping add $3.50. Please call for Air Express shipping.

Send for FREE FHL NewsLetter and catalog.
****Most of our software requires OS9 LII and 512K.**
*** New LOWER PRICES!!!**

Frank Hogg Laboratory, Inc.

770 James Street - Syracuse, NY 13203
Telex 646740

Call 315/474-7856

Frank Hogg Laboratory

12 Years of Service, Support, and Friendly Help!

OS9 Software

The WIZ

by Bill Brady

Did you ever wonder why there is only one really good communications package for OS9? The WIZ is so good that no one has been able to better it in over a year on the market! Simply the best package there is for OS9 and the CoCo III. **FEATURES:** Mac-Like interface with windows, text and binary upload/download with xmodem, kermit, on line HELP, AUTOLOGGING lets you dial up and log on to your favorite service, Macros, VT52 emulation, Usage log and much more.

The Wiz requires a RS232 Pak or similar device, LII and 512K. Supports the Owl-Ware Super I/O board.

The WIZ	79.95
Disto RS232 Pak	49.95

OS9 Users Group Disk Library

We have the complete **OS9 Users Group Library** available for immediate delivery. We pay the UG a royalty so you will be helping a worthy cause when you buy these disks. All the programs include source and some documentation. The 11 disk library is the best deal if you can read 80 track double sided disks. These disks are 720K each and are all almost full. That's almost 8 megabytes of programs for only $156! The individual disks are on 35 or 40 track disks and some are double sided. Call or send for the list.

OS9 Users Group Disks each (50+ disks)	10.00
Complete 11 disk library	156.00

Inside OS9 Level II

The Book by Kevin Darling

$39.95

Are your tired of playing games with Level II? Do you want to find out what's going on inside OS9? This is the book for you! Over 200 pages of hints, kinks, bugs, source listings and much more. Written by the well known Compuserve SysOp, Kevin Darling. 'Must reading' says Dale Puckett in Rainbow!

Sculptor

Sculptor is a applications language, commonly referred to as a 4th Generation Language. Basically this means that you can create applications in one tenth the time it would normally take. Sculptors screen and print formatting make screen displays and reports easy and fast. Sculptors B+ tree index system makes record lookup lighting fast. Programs are portable too.

Sculptor	249.00
Sculptor Special (If we have any left, (call))	149.00

DynaStar

Used by more OS9 users than any other!

FEATURES: Best OS9 editor/word processor/text formatter, has everything you would expect and more, supports terminals and windows simultaneously, auto-configurable, auto-indent for C and Pascal programming, mail merge for form letters, bug free, solid. New manual makes it easier to use than ever. Most popular word processor since 1982! Uses CoCo 3's windows for pop-up help menus, can be disabled. Two key sequence to move from anywhere to anywhere in your text. WordStar command style. Will work with files larger than memory. Merge function allows stringing many files together at print time. Full block manipulation, mark, move, copy, delete, read from disk, write to disk. **Keyboard Macros**: Define or redefine any control key (up to 29) to reproduce any key sequences, including commands! Macros can be read in at startup automatically or created on the fly as needed. **Printer Control**: Supports multiple printers via a print control file that transforms imbedded control characters to printer control characters. Changing printers is easy. **Formatting Commands**: Justification, word wrap, centering, headers, footers, macros, odd and even support, multiple index generation, multiple table of contents generation and more! *DynaStar* is the last word processor you will ever have to buy! Level I version also included on disk.

DynaStar word processor/formatter	150.00

DynaSpell

by Dale Puckett

102,000 and 20,000 word dictionaries included. Supports both Level I and II. Fast, slick, the best available for OS9. Written by Rainbowtech columnist Dale Puckett.

DynaSpell spelling checker	75.00
SPECIAL WHEN PURCHASED WITH DYNASTAR	25.00

ORDERING INFORMATION VISA and M/C. NY residents add 7% sales tax. US shipping add $3.50. Please call for Air Express shipping.

Send for FREE FHL NewsLetter and catalog.
****Most of our software requires OS9 LII and 512K.**

Frank Hogg Laboratory, Inc.

770 James Street - Syracuse, NY 13203
Telex 646740

Call 315/474-7856

```
23 E1=E1+1:GOTO52
24 HPRINT(3,21),"YOU NEED A HEAD
":GOTO52
25 GOSUB127:GOTO52
26 HPRINT(10,4),"4=FEELERS
27 IFH1=0THEN33
28 IFF1=2THEN32
29 IFF1=0THEN H=95:GOSUB118
30 IFF1=1THEN H=102:GOSUB119:P1=
P1+2
31 F1=F1+1:GOTO52
32 GOSUB127:GOTO52
33 HPRINT(3,21),"YOU NEED A HEAD
":GOTO52
34 HPRINT(10,4),"5=TONGUE
35 IFH1=0THEN38
36 IFT1=1THEN39
37 IFT1=0THENX=100:H=106:GOSUB12
0:T1=1:P1=P1+1:GOTO52
38 HPRINT(3,21),"YOU NEED A HEAD
":GOTO52
39 GOSUB127:GOTO52
40 HPRINT(10,4),"6=LEGS
41 IFB1=0THEN51
42 IFL1=6THEN50
43 IFL1=0THEN H=85:GOSUB121
44 IFL1=1THEN H=62:GOSUB122
45 IFL1=2THEN H=42:GOSUB123
46 IFL1=3THEN H=38:GOSUB124
47 IFL1=4THEN H=55:GOSUB125
48 IFL1=5THEN H=77:GOSUB126:P1=P
1+6
49 L1=L1+1:GOTO52
50 GOSUB128:GOTO52
51 HPRINT(3,21),"YOU NEED A BODY
52 FORX=1TO1500:NEXTX:IFP1=13THE
N99ELSEGOSUB113:F=RND(6):HCOLOR3
:PLAY"O3T20B":HPRINT(21,1),N2$+"
,HIT A KEY":EXEC44539:HDRAW"BM19
0,27"+D$:Z=F:GOSUB106:PLAY"O4T60
CBDAEGFC
53 ON Z GOTO 54,58,64,72,80,86
54 HPRINT(30,4),"1=BODY
55 IFB2=1THEN57
56 IFB2=0THEN X=247:Y=93:H=220:G
OSUB114:B2=1:P2=P2+1:GOTO98
57 GOSUB129:GOTO98
58 HPRINT(30,4),"2=HEAD
59 IFH2=1THEN62
60 IFB2=0THEN63
61 IFH2=0THEN H=260:GOSUB115:H2=
1:P2=P2+1:GOTO98
62 GOSUB129:GOTO98
63 HPRINT(23,21),"YOU NEED A BOD
Y":GOTO98
64 HPRINT(30,4),"3=EYES
65 IFH2=0THEN70
66 IFE2=2THEN71
67 IFE2=0THEN H=273:GOSUB116
68 IFE2=1THEN H=258:GOSUB117:P2=
P2+2
69 E2=E2+1:GOTO98
70 HPRINT(23,21),"YOU NEED A HEA
D":GOTO98
71 GOSUB129:GOTO98
72 HPRINT(30,4),"4=FEELERS
73 IFH2=0THEN79
74 IFF2=2THEN78
75 IFF2=0THEN H=255:GOSUB118
76 IFF2=1THEN H=262:GOSUB119:P2=
P2+2
77 F2=F2+1:GOTO98
78 GOSUB129:GOTO98
79 HPRINT(23,21),"YOU NEED A HEA
D":GOTO98
80 HPRINT(30,4),"5=TONGUE
81 IFH2=0THEN84
82 IFT2=1THEN85
83 X=260:H=266:GOSUB120:T2=1:P2=
P2+1:GOTO98
84 HPRINT(23,21),"YOU NEED A HEA
D":GOTO98
85 GOSUB129:GOTO98
86 HPRINT(30,4),"6=LEGS
87 IFB2=0THEN97
88 IFL2=6THEN96
89 IFL2=0THEN H=245:GOSUB121
90 IFL2=1THEN H=222:GOSUB122
91 IFL2=2THEN H=202:GOSUB123
92 IFL2=3THEN H=198:GOSUB124
93 IFL2=4THEN H=215:GOSUB125
94 IFL2=5THEN H=237:GOSUB126:P2=
P2+6
95 L2=L2+1:GOTO98
96 GOSUB130:GOTO98
97 HPRINT(23,21),"YOU NEED A BOD
Y
98 GOTO6
99 GOSUB113:HPRINT(3,21),"THE WI
NNER!":PLAY"O1T60CDEFGABO2CDEFGA
BO3CDEFGABO4CDEFGABO5CDEFGAB":FO
RG=1TO2000:NEXTG:GOTO101
100 GOSUB113:HPRINT(23,21),"THE
WINNER!":PLAY"O1T60CDEFGABO2CDEF
GABO3CDEFGABO4CDEFGABO5CDEFGAB":
FORG=1TO2000:NEXTG:GOTO101
101 HCOLOR6:HLINE(110,75)-(210,1
20),PRESET,BF:HLINE(110,75)-(210
,120),PSET,B:HLINE(115,80)-(205,
115),PSET,B:HPAINT(112,77),6,6:H
PRINT(15,11),"PLAY AGAIN":HPRINT
(17,13),"(Y/N)?
102 I$=INKEY$:IFI$=""THEN102
103 IFI$="Y"THENRUN
104 IFI$="N"THEN131
105 GOTO102
106 IF Z=1THENHDRAW"BR7BD8"+DT$
107 IF Z=2THENHDRAW"BR2BD2"+DT$+
"BR10BD12"+DT$
108 IF Z=3THENHDRAW"BR2BD2"+DT$+
"BR5BD6"+DT$+"BR5BD6"+DT$
109 IF Z=4THENHDRAW"BR2BD2"+DT$+
"BR10BD12"+DT$+"BU12"+DT$+"BD12B
L10"+DT$
110 IF Z=5THENHDRAW"BR2BD2"+DT$+
"BR10BD12"+DT$+"BU12"+DT$+"BD12B
L10"+DT$+"BU6BR5"+DT$
111 IFZ=6THENHDRAW"BR2BD2"+DT$+"
BD6"+DT$+"BD6"+DT$+"BR10"+DT$+"B
U6"+DT$+"BU6"+DT$
112 RETURN
113 HLINE(6,6)-(150,48),PRESET,B
F:HLINE(166,6)-(310,48),PRESET,B
F:HLINE(9,165)-(150,175),PRESET,
BF:HLINE(169,165)-(310,175),PRES
ET,BF:RETURN
114 HCOLOR1:HCIRCLE(H,100),35,,.
4,.11,.9:HDRAW"BM"+STR$(X)+","+S
TR$(Y)+"D15":HPAINT(H,100),1,1:R
ETURN
115 HCOLOR0:HCIRCLE(H,100),13,,1
.7:HPAINT(H,100),0,0:RETURN
116 HCOLOR6:HCIRCLE(H,90),5:HPAI
NT(H,90),6,6:RETURN
117 HCOLOR6:HCIRCLE(H,91),5:HPAI
NT(H,91),6,6:RETURN
118 HCOLOR2:HDRAW"BM"+STR$(H)+",
80H10RF10RH10UHLGDFRULUR":RETURN
119 HCOLOR2:HDRAW"BM"+STR$(H)+",
80E10RG10RE10HUERFDGLURUL":RETUR
N
120 HCOLOR5:HDRAW"BM"+STR$(X)+",
121D8RU8":HCIRCLE(H,130),7:HPAIN
T(H,130),5,5:RETURN
121 HCOLOR3:HDRAW"BM"+STR$(H)+",
110NFLF2D15LU15H2LF2D16R6DL6DR6"
:RETURN
122 HCOLOR3:HDRAW"BM"+STR$(H)+",
114ND13LD13LU13D14R6DL6DR6":RETU
RN
123 HCOLOR3:HDRAW"BM"+STR$(H)+",
112ND13LD13LU13D14R6DL6DR6":RETU
RN
124 HCOLOR3:HDRAW"BM"+STR$(H)+",
103"+LR$:RETURN
125 HCOLOR3:HDRAW"BM"+STR$(H)+",
105"+LR$:RETURN
126 HCOLOR3:HDRAW"BM"+STR$(H)+",
105"+LR$:RETURN
127 HPRINT(3,21),"ALREADY HAVE I
T":RETURN
128 HPRINT(3,21),"YOU HAVE ENOUG
H":RETURN
129 HPRINT(23,21),"ALREADY HAVE
IT":RETURN
130 HPRINT(23,21),"YOU HAVE ENOU
GH":RETURN
131 POKE65496,0:WIDTH32:CLS:END
```

HAWKSoft HAWKSoft HAWKSoft HAWKSoft HAWKSoft

DOMINATION......................$18.00
MULTI-PLAYER STRATEGY GAME!
Try to take over the planet of YCNAN. Battle other players armies to take control of their provinces and defend yours. Play on a Hi-res map of the planet. Take the "RISK" and be a planet-lord today!!! Requires 1 disk and joystick or mouse. See Rainbow Review JULY 88

RAINBOW CERTIFICATION SEAL

MYDOS.........................$15.00
CUSTOMIZABLE! EPROMABLE!!
The commands Tandy left out!
MYDOS is an enhancement to Disk Extended Basic 2.1 on the CoCo 3. One command loadm and execute for M/L programs. Lowercase command entry and display on ALL screens. Screen echo and SAY command for RS Speech Pak. Point and click mouse directory.
NEW FEATURES!!!!!
Supports double-sided and 40 track drives. Set any palettes you want on power-up (RGB or CMP). Power-up in any screen width and colors (or monochrome) you wish! More options than you can shake a joystick at!!! See Rainbow Review JUNE 87

HAWKSoft KEYBOARD CABLE........$25.00
UNCHAIN YOUR KEYBOARD!
Five foot extender cable for Coco II and 3. Move your keyboard where you want it! Installation instructions and tips included! Custom lengths available.

HAWKSOFT

HAWKSoft P.O. Box 7112
Elgin, Il. 60121-7112
312-742-3084

S&H always included. Il. orders add 7% sales tax.

MLBASIC 2.0 - BASIC Compiler

If you want your BASIC programs to run up to 50 times faster, or want more programming features without learning another language, MLBASIC is for you.

MLBASIC is the most compatible BASIC compiler available for the Color Computer. WHY? Because MLBASIC fully supports:

- Low- and high-resolution graphics
- All types of I/O (disk, screen, printer, RS232)
- All available commands offered with BASIC
- Floating point functions and expressions
- Integer, floating point and string type variables and arrays
- Use of all available 512K RAM in the COCO 3
- 80,40 or 32 column text displays

MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only $59.95, you can have a programming language that will spark your interest once again in the COCO.

Before you buy another BASIC compiler for the COCO, find out if it supports everything MLBASIC supports. Then look at the price tag. We feel that it won't be long before you place an order for MLBASIC.

"MLBASIC is a fine program for any serious programmer," said David Gerald in the December 1987 RAINBOW.

<<<< **ONLY $59.95** >>>>

COCO 3 WITH DISK REQUIRED -Add $4.00 Postage.
Check, Money Order or COD accepted
Foreign orders use U.S. MONEY ORDERS only.

WASATCHWARE
7350 Nutree Drive
Salt Lake City, Utah 84121
Phone (801) 943-1546

RAINBOW
FEST
PRINCETON
OCT. 21-23

RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer.

Nowhere else will you see as many CoCo-related products or be able to attend free seminars conducted by the top Color Computer experts. It's like receiving the latest issue of THE RAINBOW in your mailbox!

RAINBOWfest is a **great opportunity** for commercial programmers **to show off new and innovative products for the first time. Princeton is the show** to get information on capabilities for the new CoCo 3, along with a terrific selection of the latest CoCo 3 software. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

A special feature of RAINBOWfest is the **Educational Sandbox,** which features **child-oriented workshops** to give hands-on experience to an age group often neglected. There are sessions for the kindergarten through third-graders, and for fourth- through seventh-graders. And, as an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

If you missed the fun at our last RAINBOWfest in Chicago, why don't you make plans now to join us in Princeton? For members of the family who don't share your affinity for CoCo, there are many other attractions in the Princeton area.

The Hyatt Regency Princeton offers special rates for RAINBOWfest. **The show opens Friday evening** with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 3 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get a special room rate.

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW affiliate, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

BE THERE!

SPECIAL EVENT!

COCO GALLERY LIVE
SHOWCASE YOUR BEST AT RAINBOWFEST

We are taking the popular "CoCo Gallery" on the road to RAINBOWfest Princeton — and we'd like you to submit your own graphics creations to be exhibited at the show!

RULES

- You can enter color or black-and-white photographs or printouts of your original artwork produced on the CoCo 1, 2 or 3. Entries must be framed, mounted or matted, and may not be smaller than 5-by-7 inches or larger than 11-by-14 inches.
- Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is ***not*** an original work.
- Along with your entry, send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.). Please include a few facts about yourself, too!
- Your name, address and phone number, along with the title of your work, must be clearly marked on the back of each entry, and a disk copy of each piece must also be included.
- Entries must be mailed to THE RAINBOW before October 10, 1988, or brought to the RAINBOWfest registration booth by 10 a.m., Saturday, October 22.
- All entries to CoCo Gallery Live become the property of Falsoft, Inc.

There will be two categories: one for graphics produced on the CoCo 1 and 2, and one for CoCo 3 graphics. Several awards will be made in each category. Winners will be determined by votes from RAINBOWfest attendees. In case of any ties, winners will be determined by our chief judge, CoCo Cat.

Prizes and ribbons will be presented Sunday, October 23, 1988, and winning entries will be published in the January '89 issue of THE RAINBOW. Send your entry to "CoCo Gallery Live," THE RAINBOW, 9509 U.S. Highway 42, Prospect, KY 40059.

YES, I'm coming to **Princeton!** I want to save by buying tickets now at the special advance sale price. Breakfast tickets require advance reservations.

Please send me:

____ Three-day ticket(s) at $9 each total ______

____ One-day ticket(s) at $7 each total ______
Circle one: Friday Saturday Sunday

____ Saturday CoCo Breakfast
at $12 each total ______

____ RAINBOWfest T-shirt(s)
at $6 each total ______
Specify size:
____ S ____ M ____ L ____ XL
(T-shirts must be picked up at the door)

Handling Charge $1 ______

TOTAL ENCLOSED ______

(U.S. Currency Only, Please)

☐ Also send me a hotel reservation card for the Hyatt Regency Princeton ($88, single or double room).

Name ____________________
(please print)

Address ____________________

City __________ State ______

Telephone __________ ZIP ______

Company ____________________

☐ Payment Enclosed, or Charge to:

☐ VISA ☐ MasterCard ☐ American Express

Account Number ____________________

Exp. Date ____________________

Signature ____________________

Advance ticket deadline: October 7, 1988. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price. Tickets will be mailed six weeks prior to show. Children 4 and under, free; over 4, full price.

Make checks payable to: The RAINBOW. Mail to: RAINBOWfest, The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, in Kentucky call (502) 228-4492, or outside Kentucky call (800) 847-0309.

Still pounding away at that keyboard?

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
RAINBOW ON DISK
RAINBOW on tape
FEBRUARY
DECEMBER
SEPTEMBER
OCTOBER 1986
Our Beginners Issue

Save Time and Money with a Combination Subscription!

SAVE up to 19%

when you buy a joint subscription to the magazine and either RAINBOW ON TAPE or RAINBOW ON DISK! A one-year subscription to THE RAINBOW and RAINBOW ON TAPE is only $91 in the U.S., $108 in Canada, $153 foreign surface rate and $188 foreign airmail. A one-year subscription to THE RAINBOW and RAINBOW ON DISK is only $115 in the U.S., $138 in Canada, $183 foreign surface rate and $218 foreign airmail.*

Every month, these convenient services bring you as many as 24 ready-to-run programs. Using the current issue of THE RAINBOW as documentation, all you have to do is load and run them. A one-year combination subscription to THE RAINBOW and RAINBOW ON TAPE or RAINBOW ON DISK give you more than 230 new programs! The typing time you save can be spent enjoying your CoCo!

RAINBOW ON TAPE For No-Fuss Fun

Back issues of RAINBOW ON TAPE are available beginning with the April 1982 issue. A single copy of RAINBOW ON TAPE is $10 within the United States; U.S. $12 in all other countries. The annual subscription rate for RAINBOW ON TAPE is $80 within the U.S.; U.S. $90 in Canada; and U.S. $105 for all other countries.*

RAINBOW ON DISK Offers OS-9 Programs

In addition to all the programs offered on tape, part of one side of RAINBOW ON DISK is formatted for the OS-9 operating system. That means you can now get all the OS-9 programs from the magazine — programs that cannot be put on tape. Back issues of RAINBOW ON DISK are available beginning with October 1986. Subscriptions to RAINBOW ON DISK are $99 a year in the U.S. Canadian rate is U.S. $115. All other countries, U.S. $130. Single copy rate is $12 in the U.S.; U.S. $14 in Canada; and U.S. $16 in all other countries.*

To order by phone (*credit card orders only*), call (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492.

Look for our envelope located between pages 66 and 67 for ordering individual subscriptions to THE RAINBOW, RAINBOW ON TAPE and RAINBOW ON DISK.

YES! Sign me up for a joint 1-year subscription (12 issues) to:

☐ **THE RAINBOW and RAINBOW ON TAPE**
☐ **THE RAINBOW and RAINBOW ON DISK**
☐ **NEW** ☐ **RENEWAL** (attach labels)

Name ____________________
Address ____________________
City __________ **State** ______ **ZIP** ______

Payment Enclosed ☐ **(*payment must accompany order)**
Charge: ☐ **VISA** ☐ **MasterCard** ☐ **Am. Express**
Account Number ____________________
Signature ____________________ **Exp.** ______

*U.S. currency only, please. In order to hold down costs, we do not bill. Kentucky residents add 5% sales tax. Please allow 6 to 8 weeks for delivery of first copies. Joint subscriptions to THE RAINBOW and RAINBOW ON TAPE or RAINBOW ON DISK begin with the current issue.

Please note: While group purchases of RAINBOW ON TAPE and RAINBOW ON DISK are permitted (and multiple subscriptions are even discounted, if purchased in one order from a club), no license to make copies is conveyed or implied. Yes, your group may even purchase a subscription to our disk/tape services, but such purchase in no way authorizes that *any* copies be made of that original disk/tape. Specifically, this means that the original disk/tape itself may indeed be kept in a club library for use by members. However, a group purchase *does not* entitle club members, individually or as a group, to copy that disk/tape.

Unauthorized copying of any copyright product is strictly illegal. The copyright (right to make copies) is in no way conveyed in the purchase transaction.

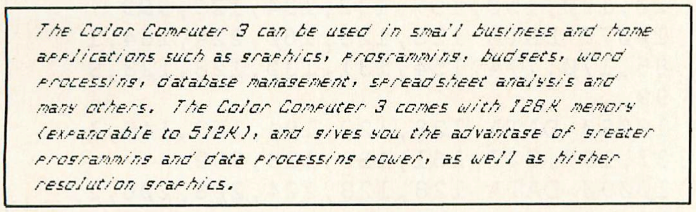
Printing in italics on the Tandy DMP-105 printer

Emphasize With the DMP-105

By David Francis

This program will allow you to add the capability of printing italics on the Tandy DMP-105. It is self-prompting and very easy to use.

When you run *Italics-105* the title banner is displayed and a check is made to ensure the printer is ready. The data for the characters is read into an array, and you are asked for the name of the file you wish to print in italics. This file is opened and printing begins.



The Color Computer 3 can be used in small business and home applications such as graphics, programming, budgets, word processing, database management, spreadsheet analysis and many others. The Color Computer 3 comes with 128K memory (expandable to 512K), and gives you the advantage of greater programming and data processing power, as well as higher resolution graphics.

Although the operation of this program is very straightforward, it can be used in two basic ways. First, if you wish to print an entire document in italics, save the document to disk in ASCII format using a word processor. Run *Italics-105*, and enter the name under which you saved the document. On the other hand, if you simply wish to print part of a document in italics, you must first save that part of the document in ASCII format. Then print the main document up to the section you want to be in italics. Run *Italics-105* and print the italicized portion. Now return to your word processor and finish printing the remainder of the main document.

If your computer will not operate in the high-speed mode, be sure to delete lines 1030 and 4040. The baud rate is set to 2400 in Line 7050, so if for some reason you must print at 600 baud, be sure to delete this line as well. Keep in mind that *everything* you save will be printed, including control codes.

Use your imagination to mix the new characters with the others available on the DMP-105. You can easily create eye-catching notices and fliers.

(Questions or comments regarding this program may be directed to the author at Box 49793, Austin, TX 78765. Please enclose an SASE when requesting a reply.) ☐

David Francis, who recently received his bachelor's degree in linguistics, has owned a Color Computer for five years. He enjoys music, reading and programming.

1120	10	10400	100
3090	66	10560	115
6070	108	10720	220
10090	110	10830	212
10250	179	END	50

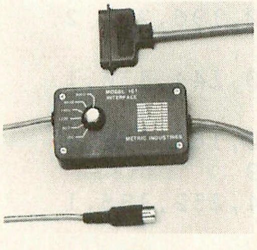
The listing: ITALICS

```
10 ' &&&&&&&&&&&&&&&&&&&&&&&&&&&&&
20 ' &        ITALICS-105         &
30 ' &     BY DAVID FRANCIS       &
40 ' &&&&&&&&&&&&&&&&&&&&&&&&&&&&&
50 CLEAR2000
60 GOSUB5000    ' PRINT TITLE
70 GOSUB6000    ' PRINTER ONLINE?
80 GOSUB7000    ' SETUP
90 GOSUB4000    ' READ CHAR. DATA
100 GOSUB3000 ' GET FILENAME
110 GOSUB2000 ' LOAD STRING
120 IF FLAG=1 THEN150
130 GOSUB1000 ' PRINT CHARS.
140 GOTO110
150 PRINT@161,STRING$(254," ")
155 PRINT@161,"END OF "F$
160 PRINT#-2,CHR$(30);:PRINT:END
```

```
1000 ' ==========================
1010 ' PRINT CHARACTERS
1020 ' ==========================
1030 POKE65495,0
1040 FOR I=1 TO LEN(T$)
1050 Z=ASC(MID$(T$,I,1))
1060 IFZ<32 THEN IF Z=13 THENPRI
NT#-2:PRINT#-2:GOTO1100
1070 Z=Z-31
1080 POKE65494,0
1090 PRINT#-2,A$(Z);
1100 NEXT
1110 PRINT#-2:PRINT#-2
1120 POKE65494,0
1130 RETURN
2000 ' ==========================
2010 ' LOAD STRING
2020 ' ==========================
2030 IF EOF(1) THENCLOSE:FLAG=1:
GOTO2080
2040 LINEINPUT#1,T$
2050 IFT$="" THEN2030
2060 PRINT@161,STRING$(254,32)
2070 PRINT@161,T$
2080 RETURN
3000 ' ==========================
3010 ' GET FILENAME
3020 ' ==========================
3030 PRINT@161,"ENTER FILENAME T
O BE PRINTED    (MUST BE IN ASCI
I FORMAT):       ";:LINEINPUTF$
3040 IFF$="" THEN3030
3050 EXT=INSTR(F$,"/")
3060 IF EXT<>0 THEN IF LEN(F$)>1
2 THEN PRINT@289,"FILENAME TOO L
ONG":GOTO3030
3070 IF EXT=0 THEN IF LEN(F$)>8
THEN PRINT@289,"FILENAME TOO LON
G.":GOTO3030
3075 PRINT@289,STRING$(32," ")
3080 OPEN"I",1,F$
3090 RETURN
4000 ' ==========================
4010 ' READ CHAR. DATA
4020 ' ==========================
4030 PRINT@161," WORKING, PLEASE
 WAIT...":PRINTSTRING$(32," ")
4040 POKE65495,0
4050 FORX=1 TO 91
4060 READA:IF A=999 THEN4090
4070 A$(X)=A$(X)+CHR$(A)
4080 GOTO4060
4090 NEXT
4100 POKE65494,0
4110 RETURN
5000 ' ==========================
5010 ' PRINT TITLE
5020 ' ==========================
5030 CLS:PRINTSTRING$(32,175);
5040 PRINTTAB(10)"ITALICS-105"
5050 PRINTTAB(7)"BY DAVID FRANCI
S"
5060 PRINTSTRING$(32,175)
5070 RETURN
6000 ' ==========================
6010 ' PRINTER ONLINE?
6020 ' ==========================
6030 IFPEEK(65314)<>5 THEN6080
6040 PRINT@161,"PRINTER IS NOT R
EADY.  PRESS    ANY KEY WHEN PRI
NTER IS READY."
6050 I$=INKEY$:IFI$=""THEN6050
6060 GOTO6030
6070 PRINT@161,STRING$(254," ");
6080 RETURN
7000 ' ==========================
7010 ' SETUP
7020 ' ==========================
7030 DIMA$(100)
7040 FLAG=0
7050 POKE150,18
7060 PRINT#-2,CHR$(27);CHR$(20);
CHR$(18);CHR$(27);CHR$(16);CHR$(
0);CHR$(0);
7070 RETURN
10000 ' =========================
10010 ' CHARACTER DATA
10020 ' =========================
10030 DATA 128,128,128,128,128,1
28,128,999
10040 DATA 128,128,192,128,144,1
36,132,130,129,999
10050 DATA 128,128,132,130,129,1
32,130,129,999
10060 DATA 128,128,192,176,144,2
20,180,150,157,132,134,129,999
10070 DATA 128,128,160,224,164,1
86,170,174,154,131,130,128,128,9
99
10080 DATA 128,128,194,163,145,1
37,197,227,161,128,128,999
10090 DATA 128,128,224,208,206,2
17,163,208,128,128,999
10100 DATA 128,128,132,130,129,9
99
10110 DATA 128,128,176,200,132,1
30,129,129,999
10120 DATA 128,128,192,192,160,1
44,137,135,128,999
10130 DATA 128,128,132,148,143,1
58,133,132,999
10140 DATA 128,128,168,152,136,1
40,138,999
10150 DATA 128,128,192,176,144,1
28,128,128,999
10160 DATA 128,128,136,136,136,1
36,136,999
10170 DATA 128,128,192,224,160,1
28,128,999
10180 DATA 128,128,192,190,129,9
99
10190 DATA 224,208,216,212,202,1
```

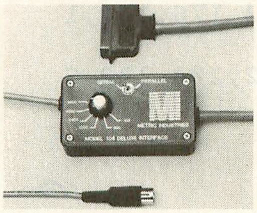
```
69,149,141,133,131,999
10200 DATA 192,192,224,144,138,1
33,131,129,999
10210 DATA 192,224,208,200,202,2
01,137,133,131,999
10220 DATA 224,192,194,201,201,1
69,153,133,131,999
10230 DATA 152,212,178,146,154,1
33,131,129,128,999
10240 DATA 224,192,196,198,197,1
65,149,141,129,128,999
10250 DATA 224,208,200,204,202,1
69,153,129,128,999
10260 DATA 192,161,145,137,133,1
31,128,999
10270 DATA 224,208,204,202,201,1
69,153,133,131,128,999
10280 DATA 192,192,204,202,169,1
53,137,133,131,128,999
10290 DATA 128,128,160,176,148,1
34,130,128,999
10300 DATA 128,128,192,192,176,1
48,134,130,128,999
10310 DATA 128,128,152,164,194,1
29,128,999
10320 DATA 128,128,144,148,148,1
48,148,132,999
10330 DATA 128,128,192,161,146,1
40,128,999
10340 DATA 128,128,192,130,145,1
37,133,131,128,999
10350 DATA 128,128,224,208,202,2
33,217,169,145,142,999
10370 DATA 192,160,144,152,148,1
46,255,128,128,999
10380 DATA 192,192,224,208,200,2
05,203,169,153,133,130,999
10390 DATA 224,208,200,196,194,1
93,161,129,131,999
10400 DATA 192,192,224,208,200,1
96,195,161,145,137,133,130,999
10410 DATA 192,224,208,200,204,2
02,201,129,129,129,129,999
10420 DATA 192,160,144,136,140,1
38,137,129,129,129,129,999
10430 DATA 224,208,200,196,194,2
09,177,145,131,999
10440 DATA 192,160,144,136,140,2
02,169,152,136,132,130,129,999
10450 DATA 192,192,224,144,136,1
32,131,129,129,999
10460 DATA 224,208,192,192,192,1
60,144,136,132,130,129,999
10470 DATA 192,160,144,136,140,1
54,169,200,132,130,129,999
10480 DATA 192,224,208,200,196,1
94,129,128,999
10490 DATA 192,160,144,136,132,1
```

New, Lowest Prices Ever On Interfaces



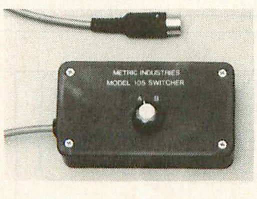
Model 101
Serial to Parallel Printer Interface

- ★ Works with any COCO
- ★ Compatible with "Centronics" Parallel Input Printers
- ★ Just turn the knob to select any one of 6 baud rates 300-9600
- ★ Comes complete with cables to connect to your printer and computer
- ★ Can be powered by most printers



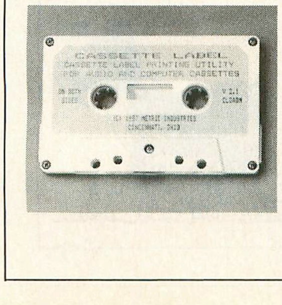
Model 104 Deluxe Interface with "Modem Switch"

- ★ **Same Features as 101 Plus**
- ★ Built in Serial Port for your Modem or other serial device
- ★ Switch between Serial Output and Parallel Output
- ★ Comes with cables to connect to your computer and printer
- ★ Can be powered by most printers



Model 105 Serial Switch

- ★ Connects to your COCO to give you 2 switch selectable Serial Ports
- ★ Comes with a 3 foot cable to connect to your computer
- ★ Now you can connect your Printer (or printer interface) and your Modem (or other serial device) to your COCO and flip the switch to use either device
- ★ Does not require power



Cassette Label Printing Program

- ★ **New Version 2.1 prints 7 lines** of information on Cassette labels
- ★ Comes on Tape with instructions to transfer to disk
- ★ Menu driven, very easy to use
- ★ **Save and Load Labels from Tape and Disk**
- ★ Uses the features of your printer to print standard, expanded, and condensed characters
- ★ **Automatically Centers Each Line of Text**
- ★ Allows editing of label before printing
- ★ Program comes with 24 labels to get you started
- ★ 16K ECB required

Some of the Printers That Can –
Supply power for the 101 and 104 are Radio Shack, Star, Okidata, Brother, Juki, and Smith Corona.

Some of the Printers That Cannot –
Supply power for the interfaces are Epson, Seikosha, Panasonic, Silver Reed and NEC. If your printer cannot supply power to the interface you can order your interface with the "P" option or you can supply your own AC adapter. We recommend the Radio Shack 273-1431 AC adapter with a 274-328 connector adapter.

Write or call for more information or for technical assistance.

Price List

Model 101	**35.95**
Model 101P	41.95
Model 104	44.95
Model 104P	51.95
Model 105	14.95
Cassette Label Program	6.95
Pin Feed Cassette Labels:	
White	3.00/100
Colors (specify)	3.60/C
Red-Blue-Yellow-Tan	
C-10 Cassette Tapes	**7.50/dozen**
Cassette Storage Boxes	2.50/dozen
4 Pin Din Serial COCO Cables:	
Male/Male 6 foot	4.49
Male/Female 6 foot	4.49
Female/Female 6 foot	4.49
Other Lengths Available.	

All items covered by a 1 year warranty

Ordering Info

- ★ **Free Shipping** in the U.S.A. and Canada (except AK and HI) on all orders over $50
- ★ On orders under $50 please add $2.50 for shipping and handling
- ★ On orders outside the U.S.A. and Canada please write or call for shipping charges

You Can Pay By:
- ★ VISA or MasterCard
- ★ C.O.D. - add $2.25
- ★ Or send check or money order payable in U.S. funds

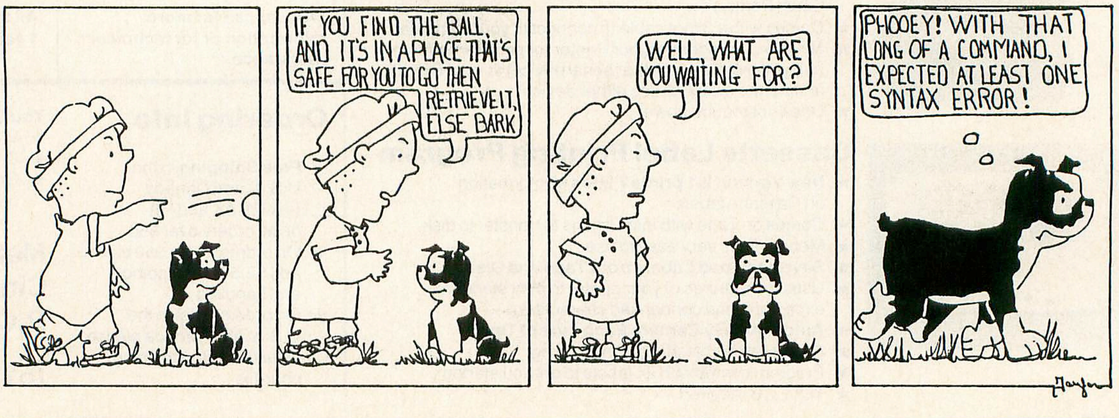
Metric Industries Inc.
Cincinnati, OH 45242
P.O. Box 42396

(513) 677-0796

```
30,193,162,148,138,133,131,129,9
99
10500 DATA 192,160,144,136,132,1
30,255,144,136,132,130,129,999
10510 DATA 224,208,200,196,194,1
61,145,137,133,130,999
10520 DATA 192,160,144,136,140,1
38,137,137,137,137,133,130,999
10530 DATA 224,208,200,196,210,1
61,209,137,133,131,999
10540 DATA 192,160,144,136,140,1
38,153,169,201,137,133,130,999
10550 DATA 192,192,196,202,201,2
01,169,145,129,999
10560 DATA 192,160,144,137,133,1
31,129,129,129,999
10570 DATA 224,208,200,196,194,1
61,144,136,132,130,129,999
10580 DATA 128,128,255,144,136,1
32,130,129,999
10590 DATA 224,208,200,164,210,2
01,160,144,136,132,130,129,999
10600 DATA 192,160,144,255,132,1
30,129,999
10610 DATA 192,160,159,136,132,1
30,129,999
10620 DATA 192,224,209,201,197,1
31,129,999
10630 DATA 192,224,208,136,132,1
30,129,129,999
10640 DATA 128,129,190,192,128,9
99
10650 DATA 192,192,192,160,144,1
36,133,131,129,999
10660 DATA 136,132,130,143,999
10680 DATA 128,128,135,136,999
10690 DATA 128,999
10700 DATA 224,208,212,212,244,2
12,136,999
10710 DATA 192,224,208,200,196,1
98,165,148,136,999
10720 DATA 224,208,200,196,196,1
32,132,999
10730 DATA 224,208,200,196,196,1
64,148,140,132,130,129,999
10740 DATA 224,208,216,212,212,1
48,148,136,999
10750 DATA 192,160,152,136,140,1
38,129,129,130,999
10760 DATA 192,192,216,212,180,1
48,140,132,999
10770 DATA 192,160,144,136,132,1
98,165,148,136,999
10780 DATA 192,160,144,136,132,1
28,129,999
10790 DATA 224,192,192,160,144,1
36,132,128,129,999
10800 DATA 192,160,144,136,156,1
70,201,136,999
10810 DATA 192,192,224,144,136,1
32,131,129,999
10820 DATA 192,160,144,140,164,1
48,200,164,152,999
10830 DATA 192,160,144,140,196,1
64,148,136,999
10840 DATA 224,208,200,196,196,1
64,148,140,999
10850 DATA 192,160,144,152,148,1
48,148,136,128,999
10860 DATA 128,152,212,180,148,1
40,132,999
10870 DATA 192,160,144,136,132,1
32,132,136,999
10880 DATA 192,192,216,212,212,1
64,132,999
10890 DATA 224,208,204,132,134,1
32,999
10900 DATA 224,208,200,196,224,2
08,136,132,999
10910 DATA 128,252,160,144,136,1
32,999
10920 DATA 224,208,200,164,208,1
92,160,144,136,132,999
10930 DATA 192,160,144,252,136,1
32,999
10940 DATA 192,216,212,176,144,1
36,132,999
10950 DATA 192,228,212,204,132,9
99
```

Dr. Nibble

By Kelly Taylor


IF YOU FIND THE BALL, AND IT'S IN A PLACE THAT'S SAFE FOR YOU TO GO THEN RETRIEVE IT, ELSE BARK
WELL, WHAT ARE YOU WAITING FOR?
PHOOEY! WITH THAT LONG OF A COMMAND, I EXPECTED AT LEAST ONE SYNTAX ERROR!
Taylor

Making the MicroWorld of

CoCo's AFFORDABLE....

CoCo III	Special	$139
Drive 0 (NEW)		$235
CM-8 Monitor	Special	$239
Deluxe Joystick		$ 24
Mouse		$40
Joysticks (pair)		$13
Disk storage box (50)		$12.50
CCR-81 Cass. Rec.		$42

Disks (SS)	$7.00/box
Disks (DS)	$7.50/box
*Includes free library case	
DMP-106	$159
DMP-130A (120 CPS)	$265
DMP-440	$545
Tandy 1000 HX	$555
Tandy 1000 TX	$899
VM-4 Monitor	$ 99
CM-5 Monitor	$240
CM-11 Monitor	$325

CoCo 3 512K Upgrade	$135
MultiPak Upgrade (26-3024)	$ 12
MultiPak Upgrade (26-3124)	$ 12
OS-9 Level 2	$ 63.95

Minimum Order $15.00

* Please Note - Our ads are submitted early, so prices are subject to change!!! We appreciate your cooperation & understanding in this matter.

Method of Payment:
MC, Visa, Am.Ex. - Sorry, No Citiline!
Certified Check or Money Order.
Personal Checks - Allow 1 week to clear!

FREE PRICE LIST AVAILABLE

20 % OFF ALL TANDY SOFTWARE
MIN. 15% OFF ALL TANDY HARDWARE

- * Full TANDY Warranty
- * 100% TANDY PRODUCTS
- * FREE UPS Shipping
  †on orders over $50.00
  under $50 add $2.00

==> CALL <==
In Pa:
215 863-8911
In N.J.:
201 735-6138

COMPUTER CENTER
MicroWorld

Rts 33 & 512, Wind Gap, PA 18091

Laneco Plaza, Clinton, N.J. 08809

C.O.D. ADD $5.00
ALL PRICES INCLUDE SHIPPING†!!!
(In Continental US)

100% TANDY EQUIPMENT WITH FULL
RADIO SHACK WARRANTY

Just when you thought it was safe to go back into the tombs . . .

Escape From Tut's Tomb, Parts 2 and 3

By Chris McKernan

Talk about cliffhangers, gentle reader. Last month we left you busily keying in the first part of *Tut's Tomb*. No doubt you took a tumble into the passages and found yourself menaced by scorpion-tailed bats, disembodied dragon heads and other uglies. You might have discovered that it's hard to stay alive to the end of a five-level maze when you have only three lives. Those are the breaks, Adventurer.

But if you're one of the quick-on-your-feet elite, you might have made it past the curses, the vile creatures whose job it is to prevent you from completing the fifth and final maze of Part 1 and receiving your hint. (*What* hint? We're not telling.)

In fact, if you made it through Part 1 of *Tut's Tomb*, you can classify yourself as an arcade addict. And from there it's a safe assumption that right now you are experiencing withdrawal symptoms induced by the *Tut's Tomb* cliffhanger. (You'll recognize this condition by observing the behavior of your fingers, which will restlessly seek to manipulate a joystick that isn't there.)

Here at THE RAINBOW, we take everyone's welfare to heart — even you arcade junkies and video Adventurers. And so, without further ado, we bring you parts 2 and 3 of *Tut's Tomb*, which add up to 10 more mazes of thrills-and-chills excitement!

Part 2

Flex your fingers and follow these steps to key in Part 2 of *Tut's Tomb*:

1) Type in and save the listings `2PART1` and `2PART2`
2) Reset the computer with a cold start (enter `POKE 113,0` and press the reset button) and load `TUT1` from last month by entering (`C`) `LOADM "TUT1",16384`

Chris McKernan is an electronics technician for Paramax Electronics. His hobbies include computers, photography and music.

3) `RUN "2PART1"`
4) `RUN "2PART2"`
5) `(C)SAVEM "TUT2",20479, 26405,26405`
6) `(C)LOADM "TUT2",49152`
7) `(C)SAVEM "TUT2",4095, 10021,10011`

When run, the two BASIC listings build a machine language file, `TUT2`. Steps 6 and 7 change the loading addresses.

Part 3

To generate Part 3 of *Tut's Tomb*, `TUT3`, do the following:

1) Type in and save the listings `3PART1` and `3PART2`
2) Reset the computer with a cold start (enter `POKE 113,0` and press the reset button) and load `TUT1` from last month by entering `(C)LOADM "TUT1",16384)`
3) `RUN "3PART1"`
4) `RUN "3PART2"`
5) `(C)SAVEM "TUT3",20479, 26405,26405`
6) `(C)LOADM "TUT3",49152`
7) `(C)SAVEM "TUT3",4095, 10021,10011`

You have now created the third and final machine language file, `TUT3`.

Wrapping It Up

After all this work, your *Tut's Tomb* program should consist of the following files:

```
ONE.BAS
TWO.BAS
THREE.BAS
FOUR.BAS
TUT1.BIN
2PART1.BAS
2PART2.BAS
TUT2.BIN
3PART1.BAS
3PART2.BAS
TUT3.BIN
```

All you have to do to execute the game is enter `(C)LOADM "TUT1"` and `EXEC`.

Mummy's the Word

For the benefit of those who were not with us last month, *Tut's Tomb* is an arcade game in which as an Adventurer you have discovered the priceless tomb of King Tut — but at perhaps the cost of your life (of which you have three, by the way).

Five obstacles stand in your way to riches, fame and glory, and rather ghastly obstacles at that: scorpion-tailed bats, blue serpents, giant spiders, disembodied dragon heads and curses. For your defense against these creatures, you carry a musket, which you can fire only to the left and right; you need a joystick plugged into the right joystick port. Creatures are killed by being shot in the upper part of their bodies. But you can't get rid of them for long, however: Every time a creature is killed near its lair, a new one materializes to take its place.

In each maze level, the goal is to grab all the goodies you can (not forgetting the key) and sneak past the monsters into the next level.

Programming buffs might want to examine Table 1 for a listing of the routines used and their locations.

Psst! If you find you're losing all your lives before you can complete even the first or second maze, you might want to check out the program *Immortality Finder* in Novices Niche, Page 76.

(Questions or comments regarding this program may be directed to the author at 2369 Madison #9, Montreal, Quebec, Canada H4B 2T5. Please enclose an SASE when requesting a reply.) ☐

Table 1: Routines Listing

LOCATION	NAME OF ROUTINE	LOCATION	NAME OF ROUTINE
5939 (BASE 10)	Sound Routine	7278	Initialize Creatures
6000	PMODE	7397	Check Left
6023	PCLS	7412	Check Right — for Creatures
6036	Character print X=LOC A=CHAR	7427	Check Up
6062	SCORE (Prints Score)	7442	Check Down
6108	"HIGH:"	7459	Dir 5 (exit Lair)
6149	Highscore print	7533	Pick Direction
6195	LVL:0 (not used)	7642	Move Left
6237	SHIPS:0 (not used)	7667	Move Right
6256	Print Maze	7692	Move Down
6403	Maze Data	7718	Move Up
6511	Check Up	7744	Move 2
6541	Check Down — for explorer	7804	Creature Main Movement
6562	Check Left	7894	— STOP —
6581	Check Right	9307	Move Change
6600	Print Man	9451	Change 2
6628	Erase Man	9548	Take Prize
6647	Move Up	9601	Print Key
6670	Move Down — for explorer	9636	Take Key
6693	Move Left	9678	Next Maze??
6715	Move Right	9742	Check for kill
6738	Laser Right	9810	Implement Check
6789	Laser Left	9853	DIR 5 SOUND
6846	Move or Fire (Main Routine)	9909	Clear screen, print key, treasure & CAM
6926	Print Key & Treasure	10006	— STOP —
6978	New Game Resets Variables	10011	Relocate Stacks & Start Game
7002	Clear Creatures Resets Positions	5130	Print "GAME OVER"
7024	Print Smoke X=LOC	5200	Dead Sound
7049	Blank Print X=LOC	5300	Laser Sound
7066	Points (creature)	5400	Delay Creature dead (smoke)
7104	Check Hit	5550	Sound Key
7247	Print Creature	5600	Sound Treasure

Editor's Note: For your convenience, last month's machine language file, TUT1, *is included on this month's* RAINBOW ON TAPE *and* DISK, *along with this month's four* BASIC *programs and the two ML files for parts 2 and 3 of* Tut's Tomb*:* TUT2.BIN *and* TUT2.BIN. RAINBOW ON TAPE *and* DISK *users will only need to load Part 1,* TUT1, *and type* EXEC. *The files have already been moved to their proper memory locations.*

140	108	1260	71
290	236	1400	248
520	228	1600	72
680	27	1750	41
900	138	END	91
1050	242		

Listing 1: 2PART1

```
5 CLEAR 100,&H4FFE
10 REM ########################
     ## RUN after LOADING  ##
     ## TUT1 SEE TEXT      ##
     ########################
15 FOR X=20479 TO 21959:READ DT:
POKE X,DT:NEXT X
20 DATA 189,18,119,189,23,112,18
9,23
30 DATA 135,189,38,229,189,23,17
4,189
40 DATA 23,220,189,24,5,189,24,9
3
50 DATA 127,30,250,134,1,183,31,
54
60 DATA 183,31,55,134,240,183,31
,24
70 DATA 189,25,3,189,24,112,189,
25
80 DATA 200,189,27,14,189,27,90,
189
90 DATA 18,92,182,255,0,129,254,
39
100 DATA 4,129,126,38,245,189,37
,76
110 DATA 189,37,164,189,38,82,18
9,38
120 DATA 125,79,177,30,237,38,19
,189
130 DATA 20,10,182,255,0,129,254
,16
140 DATA 39,255,157,129,126,38,2
43,126
150 DATA 15,255,189,26,190,189,3
7,206
160 DATA 189,28,110,189,29,35,18
9,16
170 DATA 162,189,16,152,189,30,1
24,189
180 DATA 25,200,189,23,174,189,3
6,235
190 DATA 16,142,0,0,49,33,16,140
200 DATA 9,196,39,2,32,246,126,1
6
210 DATA 68,79,189,25,228,57,128
,184
220 DATA 255,15,57,182,39,116,12
9,180
230 DATA 36,7,139,60,183,39,116,
32
240 DATA 3,127,39,116,189,29,109
,57
250 DATA 57,255,255,255,255,255,
255,255
260 DATA 255,0,0,0,0,0,0,0
270 DATA 0,0,0,0,0,134,128,184
280 DATA 255,15,182,255,15,183,4
,0
290 DATA 32,243,0,0,0,0,0,0
300 DATA 0,0,0,0,4,0,0,0
310 DATA 0,0,0,0,0,0,0,0
320 DATA 4,0,0,0,0,0,0,0
330 DATA 0,0,0,0,0,0,0,0
340 DATA 83,251,255,255,255,255,
255,255
350 DATA 255,255,255,255,255,255
,255,255
360 DATA 255,255,255,255,255,255
,255,255
370 DATA 255,255,255,255,255,255
,255,255
380 DATA 255,255,255,255,255,255
,255,255
390 DATA 255,255,255,255,255,255
,255,255
400 DATA 255,255,255,255,255,255
,255,255
410 DATA 255,255,255,255,255,255
,255,255
420 DATA 255,0,0,0,0,0,0,0
430 DATA 0,0,0,0,0,0,0,0
440 DATA 0,0,0,0,0,0,0,0
450 DATA 0,0,0,0,0,0,0,0
460 DATA 0,0,0,0,0,0,0,0
470 DATA 0,0,0,0,0,0,0,0
480 DATA 0,0,0,0,0,0,0,0
490 DATA 0,0,0,0,0,0,0,0
500 DATA 35,255,255,255,255,255,
255,255
510 DATA 255,255,255,255,255,255
,255,255
520 DATA 255,255,255,255,255,189
,21,224
530 DATA 189,21,224,189,21,224,1
27,255
540 DATA 201,127,255,34,127,255,
202,127
550 DATA 255,206,127,255,192,127
,255,194
560 DATA 127,255,196,142,17,248,
16,142
570 DATA 4,0,95,166,128,167,160,
```

VISA

<<< GIMMESOFT >>>

MasterCard

A new generation of Color Computer products

V-Term Terminal Emulator (128k or 512k CoCo III only) ◀◀◀ IMPROVED!

V-Term is one of the most advanced terminal programs for the CoCo III ever!!!

FEATURES: VT-100, VT-52, Vidtex(includes RLE graphics display), and standard CRT emulations. Full use of 512K, 80X28 text or graphics characters, Windows & Multi-tasking(Disk Basic!), RAMDISK like buffer, Xmodem, Xmodem-CRC, Ymodem, Xon/Xoff, Monochrome monitor support, Capture buffer, Snapshot, Conference mode, Serial/RS-232/DCModem Pak, 35/40/80 Tracks, Over 56 pages of docs! Disk ...... $39.95 Ver 02.00.00 upgrade $6.95

CoCo Max III (CoCo III only) See April '88 review. Built in Animation! / Amazing Color Sequencing!!! Comes with HI-RES INTERFACE, MINILOAD/BAS, DEMO DISK, COCO SHOW PGM. Sale $74.95

MAXSOUND (128k or 512k CoCo III only) See June '88 review

Turn your CoCo III into a REAL digital audio sampler with HIGH quality audio reproduction. Easily add exotic effects, ECHO, stuttering, speed shifting, sequencing, and reverse audio to BASIC or ML programs or GRAPHICS! Now includes Data Compression. Imagine recording any Voice, Music, or Sound effect and being able to use these DIGITAL recordings in your own programs! 3 disk sides includes: INTERFACT/BIN - ML driver for sound effects. G&M/BAS - Adds sound effects to Graphics. SHOWTIME and DEMO disks. SCOPE/BAS - Turns CRT into a Digital Oscilloscope to look at MAXSOUND waveforms. **CALL TO HEAR 'OVER THE PHONE' DEMO** $59.95

MAXSOUND SOUNDTRACKS W/GRAPHICS (MAXSOUND program NOT req'd) Call for Titles $5.95

GRAPHICS-25 (512k CoCo III only) Goes great with MAXSOUND!

Utilize the FULL 512k memory range of your CoCo III from BASIC for graphics! Create up to 25 ONBOARD HIRES SCREENS! Six new BASIC commands allow instant display switching while secretly drawing other screens. Save and load screens to and from disk. Copy one screen to another. Fast Graphics action, Smooth animation, and 100% Machine Language code. Requires DECB 1.0, DECB 1.1, or FKEYS III. Complete with documentation. Disk .. $24.95

MULTI-LABEL III (CoCo III only) See July '87 review. An easy to use, versatile label creating program including many new CoCo III features. Print multiple fonts on each label! Disk $16.95

FKEYS III (CoCo I/II/III) See April '87 review. A user friendly, user programmable function key utility that creates up to 20 function keys. Includes an EDITOR, DOS mods, DISABLE, and it's EPROMable!. Disk $19.95

SIXDRIVE (CoCo I/II/III) This machine language utility modifies DECB 1.0, 1.1, FKEYS III, or ADOS to allow the use of 3 double-sided drives (or 2 D/S drives and **J&R's RAMDISKS**) as 6 S/S drives. Disk .. $16.95

AUTO DIM (CoCo III only) See Jan. '88 review. This hardware device protects your monitor, or TV from IMAGE BURN after a few minutes of inactivity from your keyboard. Illustrated and easy to install. Hdwe $29.95

MPI-CoCo Locking Plate (CoCo III only) **Now 2 styles** Protects your CoCo III and Multi Pak Interface from destroying each other! Please specify MPI number 26-3024 or 26-3124 when ordering! Only $9.95

In Quest of the Star Lord (CoCo III only) Enjoy the mixture of science and fantasy as you quest for the Phoenix Crossbow, the only thing that can save you in the post-holocaust world. **4 Disk sides** of animated graphics adventure! Outstanding 320x200 graphics! Disk ...... $34.95 Hint Sheet $3.95

Kung-Fu Dude (CoCo I/II/III) See Feb. '88 review. A Kung-Fu program for the CoCo. Destroy opponents and evade obstacles as you grow even closer to your ultimate objective! Disk $24.95

PYRAMIX (CoCo III only) See Dec. '87 review. Brilliant colors, sharp graphics, and hot action! Disk .. $19.95

AD&D Character's Companion (CoCo I/II/III) Great timesaving utility helps create a compatible AD&D character. Includes a dice rolling routine, pick ability, race and class. Buy anything from the Players Handbook, magic items and spell materials. Save, load and print character info. 3 Disk sides $24.95

White Fire of Eternity (CoCo I/II/III) See Dec. '86 review. A great graphics adventure! Disk.. $19.95

CHAMPION (CoCo I/II/III) See May '87 review. Become a superhero in this action adventure! Disk..$19.95

Toll Free 1-800-441-GIME Order Line

Technical assistance: 7pm to 9pm
Orders: 9am to 9pm Eastern time
On-line orders and up to date
information: Delphi's CoCo Sig

GIMMESOFT
P.O. Box 421
Perry Hall, MD 21128
301-256-7558 or 301-256-2953

Add $3.00 for shipping and handling
Add $2.50 for COD (USA only)
MD residents add 5% sales tax
VISA/MC/Check/Money Order/COD

```
92
580 DATA 193,78,39,2,32,245,182,
30
590 DATA 220,183,15,161,182,30,2
21,183
600 DATA 15,162,182,30,222,183,1
5,163
610 DATA 182,30,223,183,15,164,1
82,30
620 DATA 224,183,15,165,134,100,
183,15
630 DATA 160,57,4,4,4,4,4,4
640 DATA 4,0,0,0,0,0,0,0
650 DATA 0,3,12,21,5,32,4,5
660 DATA 5,16,5,18,32,1,14,4
670 DATA 32,4,5,5,16,5,18,32
680 DATA 32,32,32,32,32,32,32,32
5,255,255
1060 DATA 255,0,0,0,0,0,0,0
1070 DATA 0,0,0,0,0,0,0,0
1080 DATA 0,0,0,0,0,0,0,0
1090 DATA 0,0,0,0,0,0,0,0
1100 DATA 0,0,0,0,0,0,0,0
1110 DATA 0,0,0,0,0,0,0,0
1120 DATA 0,0,0,0,0,0,0,0
1130 DATA 0,0,0,0,0,0,0,0
1140 DATA 193,255,255,255,255,25
5,74,32
1150 DATA 32,255,255,255,255,255
,255,255
1160 DATA 255,255,255,255,255,25
5,255,255
1170 DATA 255,255,255,255,255,25
5,255,255
1180 DATA 255,255,255,255,255,25
5,255,255
1190 DATA 255,255,255,255,255,25
5,255,255
1200 DATA 255,255,255,255,255,25
5,255,255
1210 DATA 255,255,255,255,255,25
5,255,255
1220 DATA 255,0,0,0,0,0,0,0
1230 DATA 0,0,0,0,0,0,28,185
1240 DATA 187,185,197,162,30,13,
185,236
1250 DATA 187,185,197,189,51,177
,106,0
1260 DATA 188,225,183,77,174,84,
173,45
1270 DATA 173,196,0,0,0,0,0,85
1280 DATA 85,85,85,85,85,85,85,8
5
1290 DATA 85,85,85,85,85,85,85,8
5
1300 DATA 85,85,85,85,85,85,85,8
5
1310 DATA 85,85,85,142,42,77,134
,13
1320 DATA 189,23,148,142,42,78,1
34,19
1330 DATA 189,23,148,142,42,79,1
34,20
1340 DATA 189,23,148,142,42,80,1
34,21
1350 DATA 189,23,148,142,42,82,1
34,22
1360 DATA 189,23,148,142,42,83,1
34,23
1370 DATA 189,23,148,142,42,84,1
34,24
1380 DATA 189,23,148,142,42,85,1
34,25
1390 DATA 189,23,148,57,70,68,32
,13
1400 DATA 0,198,30,247,20,179,13
4,255
1410 DATA 16,142,0,15,189,23,51,
246
1420 DATA 20,179,90,193,1,39,5,2
47
1430 DATA 20,179,32,234,57,0,0,0
1440 DATA 0,0,0,0,0,0,0,0
1450 DATA 0,0,0,0,0,0,0,0
1460 DATA 0,118,255,255,255,255,
255,255
1470 DATA 255,255,255,255,255,25
5,255,255
1480 DATA 255,255,255,255,255,25
5,255,255
1490 DATA 255,255,255,255,255,25
5,255,255
1500 DATA 255,255,255,255,255,25
5,255,84
1510 DATA 85,84,84,69,84,85,84,6
6
1520 DATA 13,13,13,32,2,191,21,2
2
1530 DATA 142,36,14,16,142,0,2,1
34
1540 DATA 255,230,132,189,23,51,
48,1
1550 DATA 140,36,33,46,2,32,236,
190
1560 DATA 21,22,57,0,0,0,0,0
1570 DATA 0,0,0,0,0,0,0,0
1580 DATA 0,0,0,0,0,0,0,0
1590 DATA 0,0,0,0,0,0,0,0
1600 DATA 0,0,0,0,0,0,0,0
1610 DATA 0,0,0,0,0,0,0,0
1620 DATA 0,25,255,255,255,255,2
55,255
1630 DATA 255,255,255,255,255,25
5,255,255
1640 DATA 255,255,255,255,255,25
5,255,55
1650 DATA 122,16,142,0,0,49,33,1
6
1660 DATA 140,15,160,38,248,57,1
98,50
1670 DATA 16,142,0,40,189,23,51,
134
```

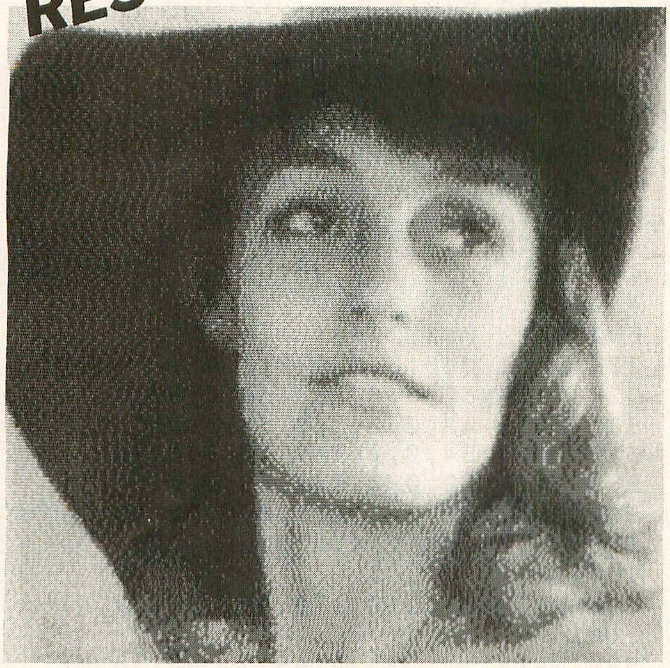
DIGISECTOR DS-69B

NEW

VIDEO DIGITIZER FOR THE COCO 3

(AND ALL OTHER COCOS . . .)

SUPER RESOLUTION !!!



COCO 3 SCREEN

USE YOUR COCO 3 TO ITS FULL POTENTIAL!
Use The Micro Works' DIGISECTOR™ DS-69 or DS-69B and your COCO 3's high resolution graphics to capture and display television pictures from your VCR or video camera. The DIGISECTOR™ systems are the only COCO video digitizers available that accurately capture and reproduce the subtle shades of gray in TV pictures!

- **COLOR:** Add color to your screen for dramatic special effects.
- **HIGH RESOLUTION:** 256 by 256 spatial resolution.
- **PRECISION:** 64 levels of grey scale.
- **SPEED!** 8 images per second on DS-69B, 2 images per second DS-69.
- **COMPACTNESS:** Self contained in a plug-in Rompack.
- **EASY TO USE:** Software on disk will get you up and running fast!
- **COMPATIBLE:** Use with a black and white or color camera, a VCR or tuner.
- **INEXPENSIVE:** Our low price puts this within everyone's reach.

POWERFUL C-SEE 3.3 SOFTWARE
This menu-driven software will provide 5 and 16 shades of gray to the screen and to the printer with simple joystick control of brightness and contrast. Pictures taken by the DIGISECTOR™ may be saved on disk by C-SEE 3.3 and then edited by our optional MAGIGRAPH, or by COCO MAX or GRAPHICOM. This versatile new software is included in both DIGISECTORS™

DS-69B and C-SEE 3.3	**$149.95**
DS-69 and C-SEE 3.3	**$ 99.95**

TRADE IN YOUR OLD DIGISECTOR™
If you already have one of The Micro Works' DS-69 or DS-69A DIGISECTORS™, you may return it to us and we will upgrade your unit to a DS-69B.

UPGRADE DS-69A to DS-69B	**$49.95**
UPGRADE DS-69 to DS-69B	**$69.95**

The DS-69B comes with a one year warranty. Cameras and other accessories are available from The Micro Works.

NO RISK GUARANTEE
If you are not completely satisfied with the performance of your new DS-69B, you may return it, undamaged, within ten days for a full refund of the purchase price. We'll even pay the return shipping. If you can get any of our competitors to give you the same guarantee, buy both and return the one you don't like. We know which one you'll keep.

Purveyors of Fine Video Digitizers Since 1977.

THE MICRO WORKS

Terms: Visa, Mastercard, Check or C.O.D.

P.O. Box 1110 Del Mar, CA 92014 (619) 942-2400

```
1680 DATA 255,198,30,16,142,0,20
,189
1690 DATA 23,51,57,120,246,21,11
9,90
1700 DATA 193,30,37,5,247,21,119
,32
1710 DATA 223,57,0,16,142,31,49,
189
1720 DATA 37,37,57,0,0,0,0,0
1730 DATA 0,0,0,0,0,0,0,0
1740 DATA 5,185,161,161,222,7,25
5,82
1750 DATA 161,197,11,0,0,171,238
,161
1760 DATA 181,1,2,221,161,161,2,
4
1770 DATA 30,0,79,0,0,0,0,0
1780 DATA 27,255,255,255,255,255
,255,255
1790 DATA 255,255,255,255,255,83
,84,69
1800 DATA 83,84,70,70,70,70,70,8
4
1810 DATA 85,84,66,65,83,73,67,6
7
1820 DATA 67,67,67,67,67,67,67,6
7
1830 DATA 67,67,67,67,67,67,255,
134
1840 DATA 255,198,50,16,142,0,23
0,189
1850 DATA 23,51,134,255,198,25,1
6,142
1860 DATA 0,115,189,23,51,134,25
5,198
1870 DATA 50,16,142,0,230,189,23
,51
```

```
270 .......57   950 ......235
530 .......30   1150 .....227
760 ......206   END .......2
```

Listing 2: 2PART2

```
5 CLEAR 100,&H4FFE
10 REM ########################
       ## RUN AFTER RUNNING  ##
       ## 2PART1 SEE TEXT    ##
       ########################
15 FOR X=24584 TO 25634:READ DT:
POKE X,DT:NEXT X
20 DATA 4,4,4,4,4,4,4,4
30 DATA 4,4,0,0,0,0,0,4
40 DATA 0,0,0,4,0,4,0,4
50 DATA 4,0,0,0,0,0,0,0
60 DATA 4,0,4,0,1,4,0,4
70 DATA 3,0,4,0,4,4,0,4
80 DATA 4,0,0,0,4,3,0,4
90 DATA 4,4,4,4,4,4,4,4
100 DATA 4,4,4,4,4,4,4,4
110 DATA 4,3,0,0,0,0,0,4
120 DATA 4,4,0,4,0,4,0,4
130 DATA 0,0,0,4,0,4,4,4
140 DATA 4,4,4,4,0,4,0,0
150 DATA 4,4,0,0,0,0,0,4
160 DATA 4,3,0,4,1,4,0,4
170 DATA 4,4,4,4,4,4,4,4
180 DATA 4,4,4,4,4,4,4,4
190 DATA 4,0,0,0,0,0,0,0
200 DATA 4,0,4,0,4,0,0,4
210 DATA 4,0,3,0,4,0,0,4
220 DATA 0,0,4,0,4,0,0,4
230 DATA 4,4,4,0,0,0,0,4
240 DATA 4,3,0,0,4,4,1,4
250 DATA 4,4,4,4,4,4,4,4
260 DATA 4,4,4,4,4,4,4,4
270 DATA 0,0,0,0,0,0,0,4
280 DATA 4,0,4,0,0,4,0,4
290 DATA 4,0,0,0,0,4,0,0
300 DATA 4,0,4,0,0,4,0,4
310 DATA 3,0,4,0,0,4,0,4
320 DATA 4,0,4,0,0,0,0,2
330 DATA 4,4,4,1,4,4,4,4
340 DATA 4,4,4,4,4,4,4,4
350 DATA 4,0,0,0,4,0,4,4
360 DATA 4,0,4,0,0,0,0,0
370 DATA 0,0,4,0,4,0,4,4
380 DATA 3,0,4,0,0,0,4,4
390 DATA 4,0,4,0,0,0,0,2
400 DATA 4,0,4,1,4,4,4,4
410 DATA 4,4,4,4,4,4,4,4
420 DATA 0,0,0,0,0,0,0,0
430 DATA 0,0,0,0,0,0,0,0
440 DATA 0,0,0,0,0,0,0,0
450 DATA 0,0,0,0,0,0,0,0
460 DATA 0,0,0,0,0,0,0,0
470 DATA 0,0,0,0,0,0,0,0
480 DATA 0,0,0,0,0,0,0,0
490 DATA 0,0,0,0,0,0,0,0
500 DATA 0,0,0,0,0,0,0,0
510 DATA 0,0,0,0,0,0,0,0
520 DATA 62,0,0,250,58,0,0,171
530 DATA 42,0,0,163,58,0,0,135
540 DATA 54,0,0,147,50,0,0,167
550 DATA 58,0,0,171,58,0,0,170
560 DATA 62,0,0,171,0,0,0,160
570 DATA 254,170,170,250,70,170,
170,164
580 DATA 19,168,170,177,71,33,42
,180
590 DATA 19,52,74,49,71,49,18,52
600 DATA 19,52,71,49,71,33,19,52
610 DATA 255,42,255,63,0,0,0,0
620 DATA 85,85,87,234,253,87,212
,70
630 DATA 255,87,245,18,255,223,2
```

```
44,70
640 DATA 255,255,245,19,0,0,52,7
1
650 DATA 0,0,53,19,0,0,52,71
660 DATA 0,0,55,255,0,0,52,0
670 DATA 0,0,55,63,0,0,55,52
680 DATA 0,0,55,49,0,0,55,52
690 DATA 0,0,55,49,0,0,247,52
700 DATA 247,255,215,49,213,255,
215,52
710 DATA 85,127,87,63,85,85,84,0
720 DATA 43,21,85,85,33,21,253,8
7
730 DATA 55,23,255,87,51,23,255,
223
740 DATA 52,23,255,255,17,20,0,0
750 DATA 52,20,0,0,49,20,0,0
760 DATA 63,20,0,0,0,20,0,0
770 DATA 254,20,0,0,70,20,0,0
780 DATA 18,20,0,0,71,20,0,0
790 DATA 19,20,0,0,71,23,0,0
800 DATA 18,23,247,255,70,21,213
,255
810 DATA 234,21,85,127,0,21,85,8
5
820 DATA 43,250,62,191,33,210,52
,71
830 DATA 55,70,49,19,51,18,52,71
840 DATA 52,69,49,19,17,17,20,69
850 DATA 52,69,33,17,49,18,36,70
860 DATA 63,170,43,250,0,0,0,0
870 DATA 254,42,191,63,70,49,19,
52
880 DATA 18,52,71,49,71,17,19,52
890 DATA 19,20,207,49,71,17,55,5
2
900 DATA 18,36,118,49,70,33,210,
36
910 DATA 234,47,254,42,0,0,0,0
920 DATA 2,128,10,160,170,170,25
5,240
930 DATA 63,48,63,252,31,255,23,
240
940 DATA 87,224,85,84,21,85,85,8
5
950 DATA 170,170,40,40,40,40,40,
40
960 DATA 42,42,48,224,51,96,53,2
24
970 DATA 46,96,51,96,51,95,53,22
3
980 DATA 46,95,51,95,48,223,59,1
50
990 DATA 47,6,52,10,59,156,54,13
0
1000 DATA 57,2,59,134,59,134,57,
2
1010 DATA 57,28,53,241,58,241,58
```

GARAGE SALE
SAT & SUN APRIL 12-13
34 HILLTOP LANE GREENLAWN
COMPUTER FAIR JULY 24
GET YOUR TICKETS TODAY!
DANGER
DO NOT ENTER
MOON UNIT
THIN MUFFIN
HAPPY
GO SAILING

It's fun making your own Greeting Cards, Signs, and Banners.

Coco Graphics Designer

Only $29.95

The Coco Graphics Designer produces beautiful Greeting Cards, Banners, and Signs for holidays, birthdays and other occasions.

The program features picture, border, and character font editors, so that you can modify or expand the already built in libraries. Plus a special "grabber" utility is included to capture areas of high resolution screens for your picture library.

Requirements: a Coco I, II or III with at least 32K, one disk drive, BASIC 1.0/1.1,ADOS 1.0/1.1 or JDOS. Printers supported include: Epson RX/FX, Gemini 10X, SG10, NX10, DMP 100/105/110/130/430 CGP220, many Okidata (check with Zebra), Seikosha GP100/250, Gorilla Banana, Legend 808. **Order #C323 Coco Graphics Designer**

Picture Disk #1

This supplementary picture library diskette contains over one hundred additional pictures.

#C333 Picture Disk #1 $14.95

Colored Paper Packs

150 sheets (50 each red, yellow, blue) with 60 matching envelopes. Perfect for making your productions outstanding.

#C274 Paper Pack $19.95

Three New Picture Disks

We've hired freelance professional artists to expand the selection of pictures, and fonts available for our Coco Graphics Designer. We think you'll agree that the quaility of their work is excellent. Each picture disk contains 128 pictures.

The selection of pictures has been guided by the requests we've received from our many Coco Grahics Designer customers. If we've missed drawing pictures for subjects that interest you, please submit your requests for our consideration.

Picture Disk #2 $14.95

Special Occasions: Party Hat, Cake, Gift Box, Champaigne, Juke Box, Saxaphone, etc.
Sports: Baseball, Basketball, Tennis, Running, etc.
Office: Computer, File Cabinet, Memo Pad, Clip Board, etc,
American: Flag, Eagle, Astronaut, Indian, Liberty Bell, etc.

Picture Disk #3 $14.95

Religion: Church, Cross, Candles, Menorah, Bible, Star, etc.
Animals: Dogs, Cats, Tiger, Cow, Giraffe, Birds, Elephant, Turtle, Pig, Horse, etc.
Nature: Flowers, Trees, Sunsets, Mountains, Lakes, etc.
Travel: Car, Bus, Airplane, Taxi, Gas Pump, Tickets, etc.

Picture Disk #4 $14.95

Includes these holidays and others...
Christmas: Tree, Star, Wreath, etc.
Easter: Egg, Bunny, Lillies, etc.
New Years: Calendar, Fireworks
Chanukah: Menorah, Star, etc.
Holloween: Pumpkin, Witch, etc.
Independence Day: Liberty Bell, Independence Hall, Fireworks, etc.
Presidents Day: Linclon, Washington, etc
Ground Hog Day: Ground Hog, Etc.

Two New Font Disks

Font Disk A $14.95
Contains 10 Fonts
Font Disk B $14.95
Contains 10 Fonts

NOTE: Our WICO Trackballs and Coco Car SIgn Designer are still available. See our ad in the previous issue of Rainbow.

Ordering Instructions: All orders add $3.00 Shipping & Handling. UPS COD add $3.00. VISA/MC Accepted. NY residents add sales tax.

Zebra Systems, Inc.
78-06 Jamaica Ave.
Woodhaven, NY 11421
(718) 296-2385

HOWARD MEDICAL COMPUTERS

1690 N. Elston • Chicago, IL 60622 • ORDERS (800) 443-1444 • INQUIRIES AND ORDER STATUS (312) 278-1440

★ 5 STAR FINAL AUGUST '88 CLEAR

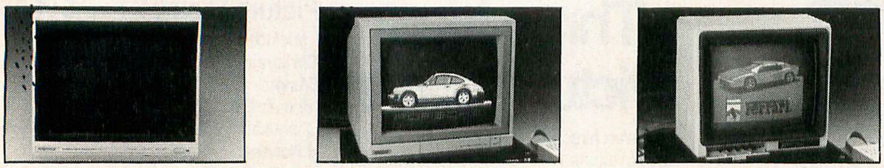
HMC CUTS $515 to $269

Hundreds of $ off Monitors sighted as Major Factor. HMC is reported to have made a special purchase on Magnavox monitors. These items, listed, are being offered at remarkable savings.

MAGNAVOX 7622 12″ Amber Screen offers 900 dots × 350 lines resolution at 20 MHz on a dark glass anti-glare CRT with built-in audio and 1 year warranty. ($7 shipping) **$88** 7652 green screen also available $88

MAGNAVOX 8 CM 515 has analog RGB for CoCo 3, TTL RGB for Tandy 1000 or IBM PC's, and composite color for CoCo 2 and 3. Built-in speaker. 14″ screen with 640 dot × 240 line resolution. Plus 2 years parts and labor warranty. reg. list $499 **was $298** **$269** + $14 Shipping

CC-3 Magnavox RGB cable only $19.95 with Magnavox Monitor order. $29.95 w/o monitor.

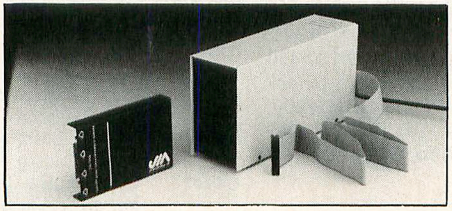


Savings have spread to the Zenith Line.

123A 12″ This 12″ green screen high resolution monitor offers 80 column capability, Zenith quality and a 90-day warranty valid at any of Zenith's 1200 locations. Retail $199. **Our price $67.50** ($7 shipping) **REPACK**

VA-1 for monochrome and color monitors delivers video interface for CoCo's 1 & 2 **$29.45** ($2 shipping)

DRIVE 0 +. ***Howards Drive 0*** gives you a DD-3 MPI drive, a CA-1 cable and a HDS DC-5 Disk Controller for only **$178.45.** Double sided double density 360K. ($5 shipping)
Add $24 for a Disto DC-3



HMC's Guarantee– A Promise you can take to the Bank.

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.

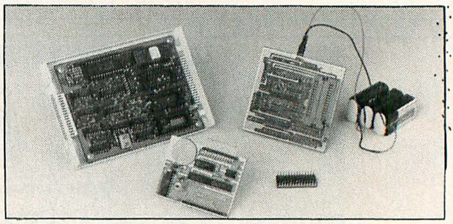
Buyout on DISTO Disk Controllers

Includes controller and C-DOS 4.0 ROM Chip. **DISTO $98** DC-3 [A]
($2 shipping on all DISTO products)

ADD-ON BOARDS

DC-3P Mini Eprom programmer includes all software to program 2764 or 27128 chips [B] **$55**

DC-3C Clock Calendar and parallel printer port [C] **$40**



Items featured as evidence of Savings

INVESTIGATION OF "LOWEST PRICES" PROVES TRUE Disc Controllers, Add–On Board & Memory provide *absolute* proof.

"Howard Medical Computer offers the Lowest Prices.!" That was the claim that was tested and verified today as HMC unveiled undeniable savings on dozens of items

hotline number

DON'T MISS OUT,
DON'T MISS OUT, ORDER TODAY!

800 / 443-1444

WE ACCEPT VISA • MASTERCARD
• AMERICAN EXPRESS • C.O.D. OR
CHECKS • SCHOOL P.O.

The Biggest
The Best
The Indispensable

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE

THE RAINBOW is the biggest, best, brightest and most comprehensive publication a happy CoCo ever had! **THE RAINBOW** features more programs, more information and more in-depth treatment of the Tandy Color Computer than any other source.

A monthly issue contains nearly 200 pages and up to two dozen programs, 14 regular columns and as many as 12 new product reviews. And advertisements: **THE RAINBOW** is known as *the* medium for advertisers — which means every month it has a wealth of information unavailable anywhere else about new products! Hundreds of programs are advertised in its pages each month.

Every single issue of **THE RAINBOW** covers the wide spectrum of interests in the Tandy Color Computer — from beginners' tutorials and arcade games to telecommunications and business and finance programs. Helpful utilities and do-it-yourself hardware projects make it easy and fun to expand your CoCo's capabilities. And, monthly reviews by independent reader reviewers take the guesswork out of buying new software and hardware products.

Join the tens of thousands who have found **THE RAINBOW** to be an absolute necessity for their CoCo. With all this going for it, is it surprising that more than 90 percent of **THE RAINBOW** subscribers renew their subscriptions? We're willing to bet that, a year from now, you'll be doing the same.

Rainbow On Tape
& Rainbow On Disk!

— great ways to bring **THE RAINBOW** into your life. Each month, all you do is pop the tape into your cassette player or the disk into your drive. No more lost weekends. As soon as you read an article about a program in **THE RAINBOW**, it's ready to load and run. No work. No wait.

Just think how your software library will grow. With your first year's subscription, you'll get almost 250 new programs: games, utilities, business programs, home applications. And, with **RAINBOW ON DISK**, you'll also get all the OS-9 programs.

RAINBOW ON TAPE and **RAINBOW ON DISK** — they're the "meat" of **THE RAINBOW** at a price that's "small potatoes." And now you even have a choice about how it should be served up to you.

To get your first heaping helping, just fill out and return the attached reply card. No postage necessary.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1 PROSPECT, KY

POSTAGE WILL BE PAID BY ADDRESSEE

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
The Falsoft Building
P.O. Box 385
Prospect, KY 40059-9989

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1 PROSPECT, KY

POSTAGE WILL BE PAID BY ADDRESSEE

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
The Falsoft Building
P.O. Box 385
Prospect, KY 40059-9989

Use our 800 number!

For credit card orders, you may want to phone in your subscription. Our *credit card order* number is (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries please call (502) 228-4492.
We accept VISA, MasterCard and American Express.
Subscriptions to **THE RAINBOW** are $31 a year in the United States. Canadian rate is $38 (U.S. funds only). Surface rate elsewhere is $68 (U.S.). Airmail is $103 (U.S.). All subscriptions begin with the current issue. Please allow 6 to 8 weeks for the first copy. Kentucky residents add 5% sales tax.
In order to hold down non-editorial costs, we do not bill.

Our 800 number is also good for ordering RAINBOW ON TAPE or RAINBOW ON DISK!

Just call (800) 847-0309 anytime from 8 a.m. to 5 p.m. EST. *Credit card orders only.* Subscriptions to **RAINBOW ON TAPE** are $80 a year in the United States, $90 (U.S. funds) in Canada and $105 (U.S.) in all other countries.
RAINBOW ON DISK is $99 a year in the United States, $115 (U.S.) in Canada and $130 (U.S.) in all other countries.
Individual issues of **RAINBOW ON TAPE** are $10 in the U.S., $12 (U.S.) in Canada and all other countries. Individual issues of **RAINBOW ON DISK** are $12 in the U.S., $14 (U.S.) in Canada, and $16 (U.S.) in all other countries. Kentucky residents please add 5% sales tax.
RAINBOW ON TAPE and **RAINBOW ON DISK** are not stand-alone products; you need the magazine for loading and operating instructions and the necessary documentation. **THE RAINBOW** magazine is a separate purchase.

Send Me Rainbow Magazine!

Here's your chance to have a Pot O' Gold full of programs, articles and information about CoCo every month of the year!

As the premier magazine for the Tandy Color Computer, **THE RAINBOW** has more of everything — and greater variety, too. Do yourself and your CoCo a favor and subscribe to **THE RAINBOW** today!

YES! Sign me up for a year (12 issues) of **THE RAINBOW.**

☐ *NEW* ☐ *RENEW (attach label)*

Name ________

Address ________

City ________ *State* ________ *ZIP* ________

☐ Payment Enclosed (payment must accompany order)

Charge: ☐ VISA ☐ MasterCard ☐ American Express

Account Number ________

Signature ________ Card Expiration Date ________

Give Your Fingers A Break!

YES! Sign me up: ☐ *NEW* ☐ *RENEW (attach label)*

☐ *RAINBOW ON TAPE* ☐ *RAINBOW ON DISK (Available beginning with the October 1986 issue)*

☐ *A Full Year* ☐ *Single Issue (specify month & year)* ________

Name ________

Address ________

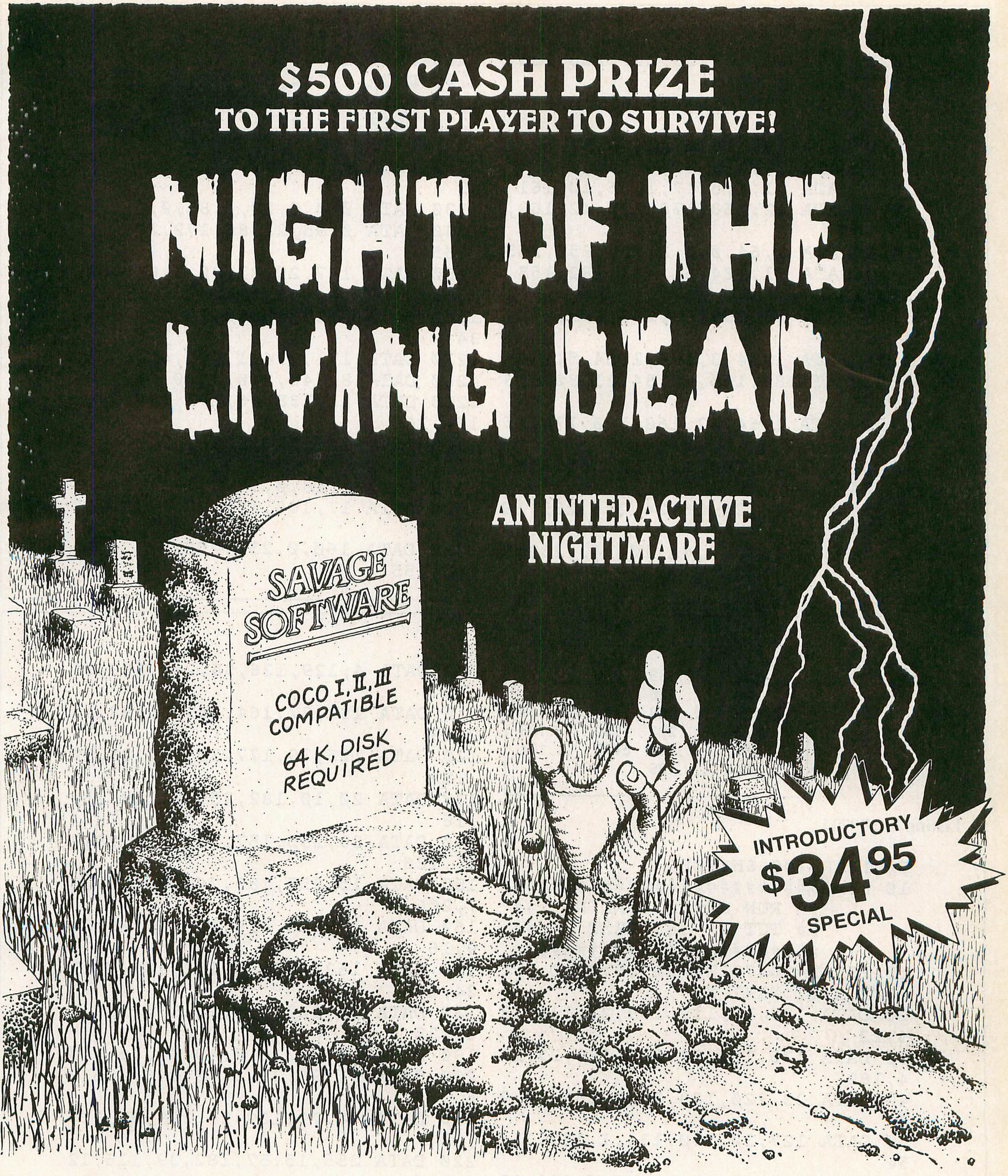
City ________ State ________ ZIP ________

☐ Payment Enclosed (payment must accompany order)

Charge: ☐ VISA ☐ MasterCard ☐ American Express

Account Number ________

Signature ________ Card Expiration Date ________


SAVAGE SOFTWARE
COCO I, II, III COMPATIBLE
64 K, DISK REQUIRED

$500 CASH PRIZE
TO THE FIRST PLAYER TO SURVIVE!

NIGHT OF THE LIVING DEAD

AN INTERACTIVE NIGHTMARE

INTRODUCTORY
$34.95
SPECIAL

ADVENTURE NOVEL SOFTWARE

P.O. BOX 8176, SPARTANBURG, SC 29305

24 hr. order HOTLINE
(803) 578-7421
C.O.D. ADD $5

ADVENTURE NOVEL™ INTERACTIVE BOOKS

MasterCard

VISA

RAINBOW
CERTIFICATION
SEAL

```
,249
1020 DATA 61,109,58,237,255,255,
255,255
1030 DATA 255,255,0,0,63,252,31,
244
1040 DATA 19,196,6,144,8,32,32,8
1050 DATA 32,8,8,32,6,144,0,0
1060 DATA 21,4,5,17,1,65,10,161
1070 DATA 42,168,170,170,42,168,
10,160
1080 DATA 1,64,0,0,2,128,255,255
1090 DATA 61,124,61,124,182,158,
189,126
1100 DATA 63,252,63,252,255,255,
4,16
1110 DATA 1,64,3,192,1,64,5,144
1120 DATA 86,165,85,84,21,80,5,6
4
1130 DATA 1,64,42,168,170,170,15
7,222
1140 DATA 42,168,10,160,255,255,
36,24
1150 DATA 36,24,36,24,255,255,16
0,10
1160 DATA 168,42,41,104,43,232,9
,96
1170 DATA 9,96,0,64,0,16,4,64
1180 DATA 1,0,5,80,31,244,7,253
1190 DATA 1,244,0,80,1,66,5,3
1200 DATA 1,65,1,69,0,85,4,16
1210 DATA 17,132,67,193,7,208,17
,68
1220 DATA 67,193,7,208,17,68,66,
33
1230 DATA 0,0,0,20,0,85,0,117
1240 DATA 0,85,21,85,172,213,170
,165
1250 DATA 187,20,21,80,5,64,168,
21
1260 DATA 8,17,40,80,32,64,131,2
34
1270 DATA 171,194,1,8,5,40,68,32
1280 DATA 84,42,2,0,3,40,11,188
1290 DATA 11,238,46,172,187,188,
175,166
1300 DATA 126,224,126,192,24,0,0
,4
1310 DATA 0,18,0,18,1,18,1,42
1320 DATA 17,168,18,128,26,0,168
,0
1330 DATA 160,0,255,255,255,255,
255,255
```

150	38	1250	154
290	236	1400	101
520	228	1560	113
670	223	1730	103
880	219	END	154
1040	135		

Listing 3: 3PART1

```
5 CLEAR 100,&H4FFE
10 REM ########################
       ## RUN after LOADING  ##
       ## TUT 1  SEE TEXT    ##
       ########################
15 FOR X=20479 TO 21959:READ DT:
POKE X,DT:NEXT X
20 DATA 189,18,119,189,23,112,18
9,23
30 DATA 135,189,38,229,189,23,17
4,189
40 DATA 23,220,189,24,5,189,24,9
3
50 DATA 127,30,250,134,1,183,31,
54
60 DATA 183,31,55,134,240,183,31
,24
70 DATA 189,25,3,189,24,112,189,
25
80 DATA 200,189,27,14,189,27,90,
189
90 DATA 18,92,182,255,0,129,254,
39
100 DATA 4,129,126,38,245,189,37
,76
110 DATA 189,37,164,189,38,82,18
9,38
120 DATA 125,79,177,30,237,38,19
,189
130 DATA 20,10,182,255,0,129,254
,16
140 DATA 39,255,157,129,126,38,2
43,126
150 DATA 15,255,189,26,190,189,3
7,206
160 DATA 189,28,110,189,29,35,18
9,16
170 DATA 162,189,16,152,189,30,1
24,189
180 DATA 25,200,189,23,174,189,3
6,235
190 DATA 16,142,0,0,49,33,16,140
200 DATA 9,196,39,2,32,246,126,1
6
210 DATA 68,79,189,25,228,57,128
,184
220 DATA 255,15,57,182,39,116,12
9,180
230 DATA 36,7,139,60,183,39,116,
32
240 DATA 3,127,39,116,189,29,109
,57
250 DATA 57,255,255,255,255,255,
255,255
```

Computer Island Educational Software

BEYOND WORDS

32K Ext. - $19.95 tape/$24.95 disk

These Language Arts programs cover common misspellings, and synonyns/antonyms on each level. Additionally, Level 1 tests contractions and abbreviations, Level 2 tests homonyms, and Level 3 tests analogies. Each program has three parts and contains over 400 questions and uses over 800 words. All tests are grade appropriate. User modifiable (directions included). Printer option. Specify Level.

Level 1	Grades 3-5
Level 2	Grades 6-8
Level 3	Grades 9-12

VOCABULARY BUILDER

32K. Ext. - $19.95 tape/$24.95 disk

200 Vocabulary questions on appropriate grade levels in a 4 part multiple choice format. 1000 words used. Extensive research has provided challenging words on all levels. When mastered, the words may be changed by the user (full directions included). Printer option. Specify Level.

Level 1	Grades 3-5
Level 2	Grades 6-8
Level 3	Grades 9-12

CONTEXT CLUES - 4, 5, 6, 7

16K Ext. - $17.95 tape/$22.95 disk

Each reading program contains about 50 situational paragraphs with one key word missing. Child uses context clues to find correct answer in multiple choice format. Random selection of readings each round. Specify 4th, 5th, 6th, or 7th grade.

CONTEXT CLUES - 2-3

32K Ext. - $19.95 tape/$24.95 disk

A reading program wherein the child uses the context to choose the correct answer. Multiple choice format. Hi-res screen. Grades 2-3.

TRIGONOMETRY TUTOR

32K Ext. - $19.95 tape/$24.95 disk

A step by step tutorial for learning to compute the sides and angles of right triangles. All examples have graphic representation. Help commands and cursor aids assist throughout.

OPENING A BANK ACCOUNT

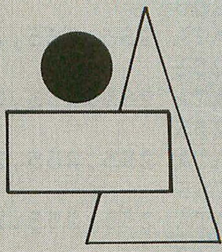
32K Ext. - $24.95 disk only

A set of programs designed to introduce and provide practice in the skills of filling out bank applications, deposit and withdrawal slips, and computing bank account balances. Loaded with graphic presentations. Grades 3-6.

EQUATIONS TUTOR

32K Ext. - $19.95 tape/$24.95 disk

Elementary-Intermediate algebra. Step by step tutorials. Multi-level. SPECIFY Linear or Quadratic.



AREA & PERIMETER

32K Ext. - $19.95 tape/$24.95 disk

Triangles, rectangles, and circles and covered in this Hi-res text and graphic program.

COCO WHEEL OF FORTUNE

32K Ext. - $19.95 tape/$24.95 disk

Hi-res graphics and screen in this version of the popular TV show. One to six players. Spin the wheel for points and guess a letter to solve the puzzle. Over 200 puzzles. Have fun while strengthening language arts skills.

MATH INVADERS

32K Ext. - $17.95 tape/$22.95 disk

A multi-level "Space Invaders" type game to reinforce the 4 basic math operations (addition, subtraction, multiplication and division). Problems become more difficult as your progress. Hi-res graphics. Joystick required.

RAINBOW
CERTIFICATION
SEAL

Computer Island

(718) 948-2748

VISA

Dept. R 227 Hampton Green, Staten Island, N.Y. 10312

MasterCard

Send for catalog with complete descriptions.

Please add $1.00 per order for postage. N.Y. residents, please add proper tax. FREE set of BINARY DICE, including full directions, with orders of 2 or more items.

Dealer Inquiries Invited. TRS-80 Color Computer **All Payments in U.S. Funds.**

```
260 DATA 255,0,0,0,0,0,0,0
270 DATA 0,0,0,0,0,134,128,184
280 DATA 255,15,182,255,15,183,4
,0
290 DATA 32,243,0,0,0,0,0,0
300 DATA 0,0,0,0,4,0,0,0
310 DATA 0,0,0,0,0,0,0,0
320 DATA 4,0,0,0,0,0,0,0
330 DATA 0,0,0,0,0,0,0,0
340 DATA 83,251,255,255,255,255,
255,255
350 DATA 255,255,255,255,255,255
,255,255
360 DATA 255,255,255,255,255,255
,255,255
370 DATA 255,255,255,255,255,255
,255,255
380 DATA 255,255,255,255,255,255
,255,255
390 DATA 255,255,255,255,255,255
,255,255
400 DATA 255,255,255,255,255,255
,255,255
410 DATA 255,255,255,255,255,255
,255,255
420 DATA 255,0,0,0,0,0,0,0
430 DATA 0,0,0,0,0,0,0,0
440 DATA 0,0,0,0,0,0,0,0
450 DATA 0,0,0,0,0,0,0,0
460 DATA 0,0,0,0,0,0,0,0
470 DATA 0,0,0,0,0,0,0,0
480 DATA 0,0,0,0,0,0,0,0
490 DATA 0,0,0,0,0,0,0,0
500 DATA 35,255,255,255,255,255,
255,255
510 DATA 255,255,255,255,255,255
,255,255
520 DATA 255,255,255,255,255,189
,21,224
530 DATA 189,21,224,189,21,224,1
27,255
540 DATA 201,127,255,34,127,255,
202,127
550 DATA 255,206,127,255,192,127
,255,194
560 DATA 127,255,196,142,17,248,
16,142
570 DATA 4,0,95,166,128,167,160,
92
580 DATA 193,78,39,2,32,245,182,
30
590 DATA 220,139,48,183,4,78,182
,30
600 DATA 221,139,48,183,4,79,182
,30
610 DATA 222,139,48,183,4,80,182
,30
620 DATA 223,139,48,183,4,81,134
,48
630 DATA 183,4,82,127,15,160,57,
4
640 DATA 4,0,0,0,0,0,0,0
650 DATA 0,3,15,14,7,18,1,20
660 DATA 21,12,1,20,9,15,14,19
670 DATA 32,25,15,21,32,1,18,5
680 DATA 32,20,8,5,32,32,32,32
690 DATA 32,19,15,12,5,32,19,21
700 DATA 18,22,9,22,15,18,32,32
710 DATA 32,32,32,32,32,32,32,32
720 DATA 32,32,32,32,32,32,32,32
730 DATA 32,25,15,21,18,32,19,3
740 DATA 15,18,5,32,9,19,32,0
750 DATA 0,0,0,0,0,0,0,0
760 DATA 0,0,0,0,0,0,0,0
770 DATA 0,0,0,0,0,134,255,183
780 DATA 43,196,183,43,197,183,4
3,198
790 DATA 183,43,199,183,43,164,1
83,43
800 DATA 165,183,43,166,183,43,1
67,57
810 DATA 182,15,160,129,100,38,1
00,182
820 DATA 30,220,177,30,230,34,32
,37
830 DATA 54,182,30,221,177,30,23
1,34
840 DATA 22,37,44,182,30,222,177
,30
850 DATA 232,34,12,37,34,182,30,
223
860 DATA 177,30,233,34,2,32,24,1
82
870 DATA 30,220,183,30,230,182,3
0,221
880 DATA 183,30,231,182,30,222,1
83,30
890 DATA 232,182,30,223,183,30,2
33,189
900 DATA 21,224,189,21,224,134,3
,183
910 DATA 30,237,182,15,161,183,3
0,220
920 DATA 182,15,162,183,30,221,1
82,15
930 DATA 163,183,30,222,182,15,1
64,183
940 DATA 30,223,57,63,4,0,0,0
950 DATA 0,0,4,0,4,0,4,0
960 DATA 4,0,0,0,0,0,0,0
970 DATA 0,0,0,0,0,0,0,0
980 DATA 194,251,255,255,255,255
,255,255
990 DATA 255,187,185,197,161,222
,7,255
1000 DATA 82,161,197,11,0,0,171,
238
1010 DATA 161,181,1,2,221,161,16
1,2
1020 DATA 4,160,240,0,255,255,25
5,255
1030 DATA 255,255,255,255,255,25
```

```
5,255,255
1040 DATA 255,255,255,255,255,25
5,255,255
1050 DATA 255,255,255,255,255,25
5,255,255
1060 DATA 255,0,0,0,0,0,0,0
1070 DATA 0,0,0,0,0,0,0,0
1080 DATA 0,0,0,0,0,0,0,0
1090 DATA 0,0,0,0,0,0,0,0
1100 DATA 0,0,0,0,0,0,0,0
1110 DATA 0,0,0,0,0,0,0,0
1120 DATA 0,0,0,0,0,0,0,0
1130 DATA 0,0,0,0,0,0,0,0
1140 DATA 193,255,255,255,255,25
5,74,32
1150 DATA 32,255,255,255,255,255
,255,255
1160 DATA 255,255,255,255,255,25
5,255,255
1170 DATA 255,255,255,255,255,25
5,255,255
1180 DATA 255,255,255,255,255,25
5,255,255
1190 DATA 255,255,255,255,255,25
5,255,255
1200 DATA 255,255,255,255,255,25
5,255,255
1210 DATA 255,255,255,255,255,25
5,255,255
1220 DATA 255,0,0,0,0,0,0,0
1230 DATA 0,0,0,0,0,0,28,185
1240 DATA 187,185,197,162,30,13,
185,236
1250 DATA 187,185,197,189,51,177
,106,0
1260 DATA 188,225,183,77,174,84,
173,45
1270 DATA 173,196,0,0,0,0,0,85
1280 DATA 85,85,85,85,85,85,85,8
5
1290 DATA 85,85,85,85,85,85,85,8
5
1300 DATA 85,85,85,85,85,85,85,8
5
1310 DATA 85,85,85,142,42,77,134
,13
1320 DATA 189,23,148,142,42,78,1
34,19
1330 DATA 189,23,148,142,42,79,1
34,20
1340 DATA 189,23,148,142,42,80,1
34,21
1350 DATA 189,23,148,142,42,82,1
34,22
1360 DATA 189,23,148,142,42,83,1
34,23
1370 DATA 189,23,148,142,42,84,1
34,24
1380 DATA 189,23,148,142,42,85,1
34,25
1390 DATA 189,23,148,57,70,68,32
```

The RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

Back Issue Availability

For greater convenience, order RAINBOW Back Issues through the Rainbow Magazine Services area of our Delphi CoCo SIG.

BACK ISSUES STILL AVAILABLE

Have you explored the wealth of information in our past issues? From our very first, four-page issue to many with more than 300 pages of material, it's all just for CoCo users — a great way to expand your library!

A WORLD OF INFO AT A BARGAIN PRICE

All back issues sell for the single issue cover price. In addition, there is a $3.50 charge for the first issue, plus 50 cents for each additional issue for postage and handling if sent by United Parcel Service. There is a $5 charge for the first issue, plus a $1 charge for each additional issue on orders sent by U.S. Mail. UPS *will not* deliver to a post office box or to another country.

MOST ISSUES STILL AVAILABLE

Issues July 1981 through June 1982 are available on white paper in a reprint form. All others are in regular magazine form. VISA, MasterCard and American Express accepted. Kentucky residents please add 5 percent state sales tax. In order to hold down costs, we do not bill, and no C.O.D. orders are accepted.

Due to heavy demand, we suggest you order the back issues you want now while supplies last.

To check availability and order, review and fill out the form on the next page and mail it with your payment to:

THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

BACK ISSUE ORDER FORM

(See overleaf for instructions.)

Please send me the following back issues:

MONTH/YEAR		PRICE	
	VOLUME 1		
JUL '81	Premier Issue	$2.00	☐
AUG '81		$2.00	☐
SEP '81	Education	$2.00	☐
OCT '81	Printer	$2.00	☐
NOV '81		$2.00	☐
DEC '81	Holiday	$2.00	☐
JAN '82		$2.00	☐
FEB '82		$2.00	☐
MAR '82		$2.50	☐
APR '82		$2.50	☐
JUN '82		$2.50	☐
	VOLUME 2		
JUN '83	Printers	$2.95	☐
JUL '83	Anniversary	$2.95	☐
	VOLUME 3		
AUG '83	Games	$2.95	☐
SEP '83	Education	$2.95	☐
OCT '83	Graphics	$3.95	☐
DEC '83	Holiday	$3.95	☐
MAR '84	Business	$3.95	☐
APR '84	Gaming	$3.95	☐
MAY '84	Printer	$3.95	☐
JUN '84	Music	$3.95	☐
JUL '84	Anniversary	$3.95	☐
	VOLUME 4		
AUG '84	Games	$3.95	☐
SEP '84	Education	$3.95	☐
OCT '84	Graphics	$3.95	☐
NOV '84	Data Comm.	$3.95	☐
DEC '84	Holiday	$3.95	☐
JAN '85	Beginners	$3.95	☐
FEB '85	Utilities	$3.95	☐
MAR '85	Business	$3.95	☐
APR '85	Simulations	$3.95	☐
MAY '85	Printer	$3.95	☐
JUN '85	Music	$3.95	☐
JUL '85	Anniversary	$3.95	☐

MONTH/YEAR		PRICE	
	VOLUME 5		
AUG '85	Games	$3.95	☐
SEP '85	Education	$3.95	☐
OCT '85	Graphics	$3.95	☐
NOV '85	Data Comm.	$3.95	☐
JAN '86	Beginners	$3.95	☐
FEB '86	Utilities	$3.95	☐
MAR '86	Business	$3.95	☐
APR '86	Home Help	$3.95	☐
MAY '86	Printer	$3.95	☐
JUN '86	Music	$3.95	☐
JUL '86	Anniversary	$3.95	☐
	VOLUME 6		
AUG '86	Games	$3.95	☐
SEP '86	Education	$3.95	☐
OCT '86	Graphics	$3.95	☐
NOV '86	Data Comm.	$3.95	☐
DEC '86	Holiday	$3.95	☐
JAN '87	Beginners	$3.95	☐
FEB '87	Utilities	$3.95	☐
MAR '87	Business	$3.95	☐
APR '87	Home Help	$3.95	☐
MAY '87	Printer	$3.95	☐
JUN '87	Music	$3.95	☐
JUL '87	Anniversary	$3.95	☐
	VOLUME 7		
AUG '87	Games	$3.95	☐
SEP '87	Education	$3.95	☐
OCT '87	Graphics	$3.95	☐
NOV '87	Data Comm.	$3.95	☐
DEC '87	Holiday	$3.95	☐
JAN '88	Beginners	$3.95	☐
FEB '88	Utilities	$3.95	☐
MAR '88	Business	$3.95	☐
APR '88	Home Help	$3.95	☐
MAY '88	Printer	$3.95	☐
JUN'88	Music	$3.95	☐
JUL '88	Anniversary	$3.95	☐
	VOLUME 8		
AUG '88	Games	$3.95	☐

RAINBOW INDEX A complete index to the first three years, July 1981 through June 1984, is printed in the July 1984 issue. Separate copies are available for $2.50 ☐

The Fourth, Fifth and Sixth Year Indexes including RAINBOW ON TAPE are printed in the July 1985, 1986 and 1987 issues, respectively. The Seventh Year Index is printed in the July 1988 issue.

TOTAL ____________

KY RESIDENTS ADD 5% ____________

U.S. MAIL CHARGE ____________

SHIPPING & HANDLING
U.P.S. CHARGE ____________

TOTAL AMOUNT
ENCLOSED ____________

Article Reprints

In instances where a given issue is now out of print and not available for purchase, we do provide photocopies of specific articles. The cost for this service is $1.50 plus 50 cents S/H per article. This service is provided *only* in the case of out-of-stock issues.

Name ____

Address ____

City ______________________ State ________ ZIP ____________

☐ Payment Enclosed, or

Charge to my: ☐ VISA ☐ MC ☐ AE

CARD # ____

EXPIRATION DATE ______________ PHONE ( ) ______________

SIGNATURE _______________________________________

TO ORDER BY PHONE (credit card orders only) call (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492.

```
,13
1400 DATA 0,198,30,247,20,179,13
4,255
1410 DATA 16,142,0,15,189,23,51,
246
1420 DATA 20,179,90,193,1,39,5,2
47
1430 DATA 20,179,32,234,57,0,0,0
1440 DATA 0,0,0,0,0,0,0,0
1450 DATA 0,0,0,0,0,0,0,0
1460 DATA 0,118,255,255,255,255,
255,255
1470 DATA 255,255,255,255,255,25
5,255,255
1480 DATA 255,255,255,255,255,25
5,255,255
1490 DATA 255,255,255,255,255,25
5,255,255
1500 DATA 255,255,255,255,255,25
5,255,84
1510 DATA 85,84,84,69,84,85,84,6
6
1520 DATA 13,13,13,32,2,191,21,2
2
1530 DATA 142,36,14,16,142,0,2,1
34
1540 DATA 255,230,132,189,23,51,
48,1
1550 DATA 140,36,33,46,2,32,236,
190
1560 DATA 21,22,57,0,0,0,0,0
1570 DATA 0,0,0,0,0,0,0,0
1580 DATA 0,0,0,0,0,0,0,0
1590 DATA 0,0,0,0,0,0,0,0
1600 DATA 0,0,0,0,0,0,0,0
1610 DATA 0,0,0,0,0,0,0,0
1620 DATA 0,25,255,255,255,255,2
55,255
1630 DATA 255,255,255,255,255,25
5,255,255
1640 DATA 255,255,255,255,255,25
5,255,58
1650 DATA 40,16,142,0,0,49,33,16
1660 DATA 140,15,160,38,248,57,1
98,50
1670 DATA 16,142,0,40,189,23,51,
134
1680 DATA 255,198,30,16,142,0,20
,189
1690 DATA 23,51,57,120,246,21,11
9,90
1700 DATA 193,30,37,5,247,21,119
,32
1710 DATA 223,57,0,16,142,31,49,
189
1720 DATA 37,37,57,0,0,0,0,0
1730 DATA 0,0,0,0,0,0,0,0
1740 DATA 5,185,161,161,222,7,25
5,82
1750 DATA 161,197,11,0,0,171,238
,161
```

```
1760 DATA 181,1,2,221,161,161,2,
4
1770 DATA 30,0,79,0,0,0,0,0
1780 DATA 27,255,255,255,255,255
,255,255
1790 DATA 255,255,255,255,255,83
,84,69
1800 DATA 83,84,70,70,70,70,70,8
4
1810 DATA 85,84,66,65,83,73,67,6
7
1820 DATA 67,67,67,67,67,67,67,6
7
1830 DATA 67,67,67,67,67,67,255,
134
1840 DATA 255,198,50,16,142,0,23
0,189
1850 DATA 23,51,134,255,198,25,1
6,142
1860 DATA 0,115,189,23,51,134,25
5,198
1870 DATA 50,16,142,0,230,189,23
,51
```

```
270 ........4
530 ......234
760 ......154
950 ......183
1150 .....221
END .....252
```

Listing 4: 3PART2

```
5 CLEAR 100,&H4FFE
10 REM ########################
       ## RUN AFTER LOADING  ##
       ## 3PART1  SEE TEXT   ##
       ########################
15 FOR X=24584 TO 25634:READ DT:
POKE X,DT:NEXT X
20 DATA 4,4,4,4,4,4,4,4
30 DATA 4,4,0,0,0,0,0,4
40 DATA 4,0,0,0,0,0,0,4
50 DATA 0,0,0,4,1,4,0,4
60 DATA 4,0,0,0,0,0,0,4
70 DATA 4,0,4,4,0,0,0,0
80 DATA 3,0,4,3,0,0,0,4
90 DATA 4,4,4,4,4,4,4,4
100 DATA 4,4,4,4,4,4,4,4
110 DATA 4,0,0,0,0,0,0,0
120 DATA 4,0,1,0,4,0,0,4
130 DATA 4,0,4,0,4,4,0,4
140 DATA 4,0,4,0,0,3,0,4
150 DATA 0,0,4,0,4,4,0,4
160 DATA 4,0,0,0,2,4,0,4
170 DATA 4,4,4,4,4,4,4,4
180 DATA 4,4,4,4,4,4,4,4
190 DATA 0,0,0,0,0,0,0,4
200 DATA 4,4,0,4,4,4,0,4
210 DATA 4,0,0,0,0,0,0,4
220 DATA 3,0,4,1,4,0,4,4
230 DATA 4,0,4,4,0,0,4,4
240 DATA 4,0,3,0,0,0,0,0
250 DATA 4,4,4,4,4,4,4,4
260 DATA 4,4,4,4,4,4,4,4
270 DATA 4,0,4,4,0,0,0,2
280 DATA 4,0,2,4,0,0,0,4
290 DATA 4,0,4,4,0,0,0,4
300 DATA 4,0,4,0,0,0,0,0
310 DATA 4,0,0,0,4,1,4,4
320 DATA 0,0,0,0,0,0,4,4
330 DATA 4,4,4,4,4,4,4,4
340 DATA 4,4,4,4,4,4,4,4
350 DATA 4,0,2,4,0,0,0,4
360 DATA 4,0,4,4,0,4,0,4
370 DATA 4,0,4,4,0,4,0,4
380 DATA 0,0,4,4,0,4,0,4
390 DATA 4,0,0,0,0,4,0,4
400 DATA 3,0,0,0,0,4,0,4
410 DATA 4,4,4,4,1,4,4,4
420 DATA 0,0,0,0,0,0,0,0
430 DATA 0,0,0,0,0,0,0,0
440 DATA 0,0,0,0,0,0,0,0
450 DATA 0,0,0,0,0,0,0,0
460 DATA 0,0,0,0,0,0,0,0
470 DATA 0,0,0,0,0,0,0,0
480 DATA 0,0,0,0,0,0,0,0
490 DATA 0,0,0,0,0,0,0,0
500 DATA 0,0,0,0,0,0,0,0
510 DATA 0,0,0,0,0,0,0,0
520 DATA 62,0,0,250,58,0,0,171
530 DATA 42,0,0,163,58,0,0,135
540 DATA 54,0,0,147,50,0,0,167
550 DATA 58,0,0,171,58,0,0,170
560 DATA 62,0,0,171,0,0,0,160
570 DATA 254,170,170,250,70,170,
170,164
580 DATA 19,168,170,177,71,33,42
,180
590 DATA 19,52,74,49,71,49,18,52
600 DATA 19,52,71,49,71,33,19,52
610 DATA 255,42,255,63,0,0,0,0
620 DATA 85,85,87,234,253,87,212
,70
630 DATA 255,87,245,18,255,223,2
44,70
640 DATA 255,255,245,19,0,0,52,7
```

GET THE BEST !!!

Excellent 36 Disk CoCo Software Library $95.00 includes Word Processor, Modems, Utilities, 124 Games, Graphics/Pics, Business, Languages, Music and More. Public Domain and Shareware. Over 850 Programs.

15% Discount to User Groups and Students. Major Credit Cards Welcomed. Call Sandra or Joe at 1-800-221-7372.

SUMMER SPECIAL SALE

Please add $4.50 for Shipping and Handling

Public Domain Software Copying Company
33 Gold Street-Suite L3
New York, N.Y. 10038

```
1
650 DATA 0,0,53,19,0,0,52,71
660 DATA 0,0,55,255,0,0,52,0
670 DATA 0,0,55,63,0,0,55,52
680 DATA 0,0,55,49,0,0,55,52
690 DATA 0,0,55,49,0,0,247,52
700 DATA 247,255,215,49,213,255,
215,52
710 DATA 85,127,87,63,85,85,84,0
720 DATA 43,21,85,85,33,21,253,8
7
730 DATA 55,23,255,87,51,23,255,
223
740 DATA 52,23,255,255,17,20,0,0
750 DATA 52,20,0,0,49,20,0,0
760 DATA 63,20,0,0,0,20,0,0
770 DATA 254,20,0,0,70,20,0,0
780 DATA 18,20,0,0,71,20,0,0
790 DATA 19,20,0,0,71,23,0,0
800 DATA 18,23,247,255,70,21,213
,255
810 DATA 234,21,85,127,0,21,85,8
5
820 DATA 43,250,62,191,33,210,52
,71
830 DATA 55,70,49,19,51,18,52,71
840 DATA 52,69,49,19,17,17,20,69
850 DATA 52,69,33,17,49,18,36,70
860 DATA 63,170,43,250,0,0,0,0
870 DATA 254,42,191,63,70,49,19,
52
880 DATA 18,52,71,49,71,17,19,52
890 DATA 19,20,207,49,71,17,55,5
2
900 DATA 18,36,118,49,70,33,210,
36
910 DATA 234,47,254,42,0,0,0,0
920 DATA 2,128,10,160,170,170,25
5,240
930 DATA 63,48,63,252,31,255,23,
240
940 DATA 87,224,85,84,21,85,85,8
5
950 DATA 170,170,40,40,40,40,40,
40
960 DATA 42,42,51,96,56,96,46,96
970 DATA 58,224,53,224,56,95,46,
95
980 DATA 58,223,53,223,58,219,59
,142
990 DATA 54,150,54,130,49,136,47
,8
1000 DATA 59,130,59,144,59,138,4
7,28
```

The Rainbow Introductory Guide to

Statistics

Most people have been using statistics since they learned to talk. Statistical results and concepts turn up everywhere. A large part of our daily news consists of statistics. Results of opinion polls, surveys, research studies, the Dow Jones industrial average and, of course, our sports news are all statistics. But statistics are often misused. The informed person needs to understand the basic concepts in order to judge the appropriateness of applications.

Rainbow Contributing Editor Dr. Michael Plog and co-author Dr. Norman Stenzel have written **The Rainbow Introductory Guide to Statistics** just for beginners. It is an easy-to-understand guide to this sometimes mysterious area of mathematics. Their aim is to introduce readers to the realm of statistical processes and thinking, and they believe that the Tandy Color Computer is an ideal machine for the reduction of data.

Sharpen your skills with **The Rainbow Introductory Guide to Statistics** for only $6.95. Included in the book is the *CoCo-Stat* program, a BASIC statistics program just for the *Color Computer.* (80-column printer required.) Forget the typing hassle by ordering the accompanying Statistics Tape or Disk for only $5.95. Spend your time learning and enjoying the new material, not debugging your typing. Just pop in the tape or disk and you're ready for action!

Save when you buy **The Rainbow Introductory Guide to Statistics** book together with the tape or disk. Get both for only $11.95.

Please send me: The Rainbow Introductory Guide to Statistics Book $6.95*
The Rainbow Introductory Guide to Statistics Tape or Disk $5.95
The Rainbow Introductory Guide to Statistics Book/Disk Set $11.95

Name ____________________
Address ____________________
City ____________________ State ______ ZIP ______
☐ My check in the amount of ______ is enclosed*
Please charge to my: ☐ VISA ☐ MasterCard ☐ American Express
Acct. No. ____________________ Exp. Date ______
Signature ____________________

Mail to: The Rainbow Introductory Guide to Statistics, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

To order by phone (credit card orders only), call (800) 847-0309, 8 a.m. to 5 p.m. EST. For other inquiries, call (502) 228-4492.

*Add $1.50 per book for shipping and handling in the U.S. Outside the U.S. add $4 per book (U.S. currency only). Kentucky residents add 5% sales tax. In order to hold down costs, we do not bill. Please allow 6-8 weeks for delivery.

Note: The tape and disk are not stand-alone products. If you buy either the tape or disk, you still need to purchase the book for instructions.

```
1010 DATA 59,130,51,113,48,233,5
3,237
1020 DATA 56,117,61,113,255,255,
255,255
1030 DATA 255,255,0,0,63,252,31,
244
1040 DATA 19,196,6,144,8,32,32,8
1050 DATA 32,8,8,32,6,144,0,0
1060 DATA 21,4,5,17,1,65,10,161
1070 DATA 42,168,170,170,42,168,
10,160
1080 DATA 1,64,0,0,2,128,255,255
1090 DATA 61,124,61,124,182,158,
189,126
1100 DATA 63,252,63,252,255,255,
4,16
1110 DATA 1,64,3,192,1,64,5,144
1120 DATA 86,165,85,84,21,80,5,6
4
1130 DATA 1,64,42,168,170,170,15
7,222
1140 DATA 42,168,10,160,255,255,
36,24
1150 DATA 36,24,36,24,255,255,16
0,10
1160 DATA 168,42,41,104,43,232,9
,96
1170 DATA 9,96,0,64,0,16,4,64
1180 DATA 1,0,5,80,31,244,7,253
1190 DATA 1,244,0,80,1,66,5,3
1200 DATA 1,65,1,69,0,85,4,16
1210 DATA 17,132,67,193,7,208,17
,68
1220 DATA 67,193,7,208,17,68,66,
33
1230 DATA 0,0,0,20,0,85,0,117
1240 DATA 0,85,21,85,172,213,170
,165
1250 DATA 187,20,21,80,5,64,168,
21
1260 DATA 8,17,40,80,32,64,131,2
34
1270 DATA 171,194,1,8,5,40,68,32
1280 DATA 84,42,2,0,3,40,11,188
1290 DATA 11,238,46,172,187,188,
175,166
1300 DATA 126,224,126,192,24,0,0
,4
1310 DATA 0,18,0,18,1,18,1,42
1320 DATA 17,168,18,128,26,0,168
,0
1330 DATA 160,0,255,255,255,255,
255,255
```

DATAMATCH, INC.

(THE SOFTWARE HOUSE HAS A NEW NAME)

DS/DD DISKS $45/100 10/$4.95

FLIPPY DISKS 10/$7.95

FACTORY PUNCHED-USE BOTH SIDES. $75/100

CERTIFIED ERROR FREE. W/SLEEVES, LABELS, W.P.

PRINTER RIBBONS

APPLE IMAGE WRITER	$ 4.95	6/$27.00
APPLE IM.WR.II 4 COLOR	$12.95	
APPLE LQ - M/S	$ 4.95	
COMMODORE MPS 801	$ 4.95	R.S. DMP110
COMMODORE MPS 803	$ 4.95	
COMMODORE 1526	$ 7.50	BLUE STREAK
DIABLO HYTYPE II - M/S	$ 4.95	
EPSON MX80/86E	$ 4.95	6/$27.00
EPSON SPECTRUM LX80/90	$ 4.50	
GEMINI 10/S/SG, BLACK	$ 2.00	DOZ./$22.00
GEM COLORS R-B-G-BR-PUR	$ 3.00	5/$12.00
NEC P2/P6 FILM	$ 6.95	
NEC P3/P7 FILM	$ 8.95	
OKIDATA 80/82/90/92 - SEE GEMINI 10		
OKI.MICROLINE 182/192	$ 7.50	
R.S. DMP130, BLACK	$ 6.95	
COLORS RED-BLU-GREEN	$ 7.95	3/$22.00
STAR NL/NX/10, BLACK	$ 7.95	
STAR RADIX 10, BLACK	$ 7.50	

OTHER RIBBONS AVAILABLE. CALL OR WRITE.

ALL ITEMS 100% GUARANTEED

Add $2.50 S/H in U.S.A. - Canada Add $3.50 + $1.00/LB
Michigan Residents Add 4% Sales Tax
Send Check/Money Order Payable to:

DATAMATCH, INC.
9020 Hemingway, Redford, MI 48239
(313) 937-1313

VISA

Send Card Number & Exp. Date   Min. Charge Order $20.00

"I cannot imagine the CoCo 3 without ADOS-3; it would not be a complete machine."

The RAINBOW, July 1987

You've moved up to a CoCo 3. A powerful new machine. Now, it's time to give BASIC a shot in the arm, with ADOS-3. Wouldn't it be nice to turn on your machine and be greeted by an 80-column display, in the colors of your choice, with your own custom startup message? To run routinely at 2 MHz (double speed) without having to slow down for disk and printer operations? This and much, much more is possible with ADOS-3, our CoCo 3 adaptation of the acclaimed original ADOS, which shares the original's virtual 100% compatibility with commercial software. After customizing ADOS-3 using the provided configuring utility, you can have it burned into an EPROM that plugs into the Disk BASIC ROM socket, or just use it in RAM as a disk utility. (EPROM + burning will cost $15-20; we provide information concerning how you can have this done.) Supports double-sided drives (35, 40, or 80 tracks). FAST and SLOW commands, auto line number prompts, RUNM command, keystroke macros, arrow-key scroll through BASIC programs, auto-edit of error line, and many more valuable features.

"ON A SCALE OF 1 TO 10, I RATE ADOS-3 A SOLID 15." RAINBOW, 7/87

Disk . . . $34.95 Original ADOS for CoCo 1 or 2 . . . $27.95 (See 6/87 RAINBOW review)

Original ADOS plus ADOS-3 ....$50.00

THE PEEPER

ML program tracer that multitasks with the target program. An excellent learning tool for the ML novice; an invaluable debugging aid for the expert. CoCo 1, 2, or 3 compatible.

Disk . . . $23.95   Assembler source listing . . . Add $3.00

MONITOR CABLES for CoCo 3

Magnavox 8CM515/8CM505/8CM643 . . . $19.95   Sony KV1311CR . . . $29.95

SPECTROSYSTEMS

11111 N. Kendall Drive,
Suite A108
Miami, Florida 33176
(305) 274-3899 Day or Eve.

No delay on personal checks • Please add $2.00 shipping • Sorry no credit cards or COD's.

NOVICES NICHE

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Game Utility

Seeking Immortality

16K
Disk

By Paul Alger

Do you have some older video games for your CoCo that you have never completed, or games with graphics screens you've never even seen before? Fear not, gamester, for now your character will live long enough to reach the trail's end.

Immortality Finder is a game utility that will help you find the elusive "immortality poke" for most video games. This poke is the memory location that holds the number of "men" you start with on a given game. If you poke this location with, say, a value of 255, then you start off the game with 255 men!

Immortality Finder works on the principle that most machine language game programmers load the number of men using an `LDA` or `LDB` command when the game is initialized. *Immortality Finder* checks the ML code for all `LDA`s and `LDB`s. It then checks the value that is loaded into the A or B register. If the value is close to the number of men you start with, that location becomes a possible immortality poke.

It's easy to use the program. Just run and enter the filename and extension of the game you want to search. The program asks how many men the game starts with. Enter that number, insert the game disk and wait for *Immortality Finder* to complete the search. When the search is complete, you have the option to print the list of possible locations to the screen or to the printer. The list gives *all* of the possible immortality poke locations.

To test a poke, first load your game, poke the location with the number of men you want, and then `EXEC`. For example, if you run *Immortality Finder* on last month's *Tut's Tomb* (July 1988 RAINBOW, Page 58), you will get a printout of nine possible locations. The first is Location 6979. In this example, we type the following:

```
LOADM "TUT1.BIN"
POKE 6979,255
EXEC
```

After giving this poke a test run, we discover — lo and behold — that it works! In fact, it gives us 255 "men" instead of three. But if Location 6979 *didn't* work, we would run the process again for the next location on the list, which happens to be Location 7090. And on and on, until we found one that did work.

Immortality Finder will not work for all games, however. Game candidates must be in RS DOS, start with a specific number of men, and fit into memory with the *Immortality Finder* program. Here are some of the games I have found to work successfully with the program: *Shock Trooper, Crash, Ninja Warrior* and *Gold Runner.*

Remember, immortality comes at a price: Gamesters who partake of the waters of immortality should not submit their immortal scores to RAINBOW's Scoreboard.

The listing: `IMMORTAL`

```
0 GOTO90
5 CLEAR200,&H2000:DIMA(50),B(50)
:CLS:PRINT"IMORTALITY FINDER":PR
INT"BY PAUL ALGER":PRINT
10 PRINT"ENTER FILENAME/EXT: ";:
LINEINPUTFI$:INPUT"HOW MANY MEN
DO YOU START WITH";C1:PRINT"INSE
RT DISK WITH "FI$" AND HIT ENTER
. ";:LINEINPUTZ$
15 OPEN"D",#1,FI$,1:IF LOF(1)=0
THEN CLOSE:KILL FI$:RUN
20 FIELD#1,1 AS A$:B=LOF(1):FORQ
=1TO5:GET#1,Q:C(Q)=ASC(A$):NEXTQ
:CLOSE:ST=(C(4)*256+C(5)):LG=(C(
2)*256+C(3)):ED=ST+LG:OF=&H2000-
ST:IF OF<1THENOF=0
25 IF OF+ED>&H8000 THENPRINT"WHE
```

```
N IO ERROR OCCURS, TYPE:":PRINT"
GOTO35
30 LOADMFI$,OF
35 CLS(3):PRINT@5,"FILENAME:";:P
RINT@16,FI$;
40 PRINT@66,"START";:PRINT@73,US
ING"#####";ST;:PRINT@66+64,"END
 ";:PRINT@73+64,USING"#####";ED;
:PRINT@66+32,"NOW  ";:PRINT@73+3
2,USING"#####";M;
45 PRINT@81,"LDA'S ";:PRINT@89,U
SING"####";LA;:PRINT@81+32,"LDB'
S ";:PRINT@89+32,USING"####";LB;
:PRINT@81+64,"POKES ";:PRINT@89+
64,USING"####";0;
50 FOR M=ST+OF TO ED+OF
55 FORM=ST+OF TO ED+OF:PRINT@105
,USING"#####";M-OF;
60 IF PEEK(M)=&H86 THEN LA=LA+1:
PRINT@89,USING"####";LA;:IF PEEK
(M+1)=C1 OR PEEK(M+1)=C1+1THEN L
=L+1:A(L)=M-OF:PRINT@153,USING"#
###";L+L1;
65 IF PEEK(M)=&HC6 THEN LB=LB+1:
PRINT@121,USING"####";LB;:IF PEE
K(M+1)=C1 OR PEEK(M)=C1+1 THEN L
1=L1+1:B(L1)=M-OF:PRINT@153,USIN
G"####";L+L1;
70 NEXT:PRINT@321," ";:INPUT"DON
E... HIT ENTER TO PRINT";Z$
75 CLS:PRINT"PRINT TO [S]CREEN O
R [P]RINTER.":PRINT"(ENTER P OR
S) ";:LINEINPUTZ$:IFZ$="P"THEND=
2ELSED=0
80 PRINT#-D,"FILENAME: ";FI$:PRI
NT#-D,"DECIMAL","HEX":FORX=1TOL:
PRINT#-D,A(X)+1,HEX$(A(X)+1):NEX
T:FORX=1TOL1:PRINT#-D,B(X)+1,HEX
$(B(X)+1):NEXT
85 PRINT"HIT ENTER TO PRINT AGAI
N.":LINEINPUTZ$:GOTO75
90 PCLEAR1:GOTO5
```

Arcade

Minding Your X's and Y's

16K
ECB

By James Kevin Lowry

You have two eyes, so you'd think you'd be able to see two things at once. Frogs can, sort of. With *JoyZap*, you had better train your eyes to be ambidextrous or be very quick.

JoyZap is a shoot-'em-up with a twist — you don't aim at your target using a "hairline" cursor; you use *guides*, points on the *x*- and *y*-axes. When you boot up *JoyZap*, the two axes are drawn and the space they enclose begins to fill randomly with blocks. Your joystick position is tracked on the axes, and your mission is to lock on to the points that define a target and press the firebutton. Red blocks are worth 20 points; blue, 10; white, 5. Be careful: If you don't hit the block squarely, hitting an adjacent space instead, the block will become green and worth only one point.

Delete Line 40 if your computer cannot handle the high-speed poke.

The listing: JOYZAP

```
10 CLS:PRINT@172,"JOYZAP":PRINT@
480,"COPYRIGHT 1987 JKL JAMES K
LOWRY":FOR Z=1 TO 1500:NEXTZ
40 POKE 65495,0
50 CLS(0)
60 S=0:SC=0
70 PRINT@480,"HITS="S"  SCORE="S
C;
80 FOR B=0 TO 63:SET(B,0,3):NEXT
90 FOR C=0 TO 27:SET(0,C,3):NEXT
100 TIMER=0
110 Z=RND(20):IF Z=10 THEN SET(R
ND(50)+7,RND(12)+7,RND(3)+5)
120 X=JOYSTK(0):Y=JOYSTK(1)
130 IF X<2 THENX=2
140 IF Y<2 THEN Y=2
150 IF Y>27 THEN Y=27
160 SET (X,2,5):SET(2,Y,5)
170 RESET(X,2):RESET(2,Y)
180 IF TIMER>7000 THEN GOTO 280
190 IF BUTTON(0)=1 THEN GOTO 200
 ELSE GOTO 110
200 H=POINT(X,Y):IF H=6 THEN GOT
O 230 ELSE IF H=7 THEN GOTO 240
ELSE IF H=8 THEN GOTO 250 ELSE I
F H=1 THEN GOTO 260
210 SET(X,Y,1):SOUND 40,5::RESET
 (X,Y)
220 GOTO 110
230 GOSUB 270:S=S+1:SC=SC+5:RESE
T(X,Y):PRINT@480,"HITS="S" SCORE
="SC;:GOTO 110
240 GOSUB 270:S=S+1:SC=SC+10:RES
ET(X,Y):PRINT@480,"HITS="S" SCOR
E="SC;:GOTO 110
250 GOSUB 270:S=S+1:SC=SC+20:RES
ET(X,Y):PRINT@480,"HITS="S" SCOR
E="SC;:GOTO 110
260 GOSUB 270:S=S+1:SC=SC+1:RESE
T(X,Y):PRINT@480,"HITS="S" SCORE
="SC;:GOTO 110
270 SOUND200,2:SOUND185,4:RETURN
280 POKE65494,0
290 PRINT"AVERAGE="INT(SC/S):END
```

Space Attack

CoCo 3

By John T. Wells

To me, the most interesting type of game for home computers has always been the space shoot-'em-up. I wrote *EZShoot* to illustrate how easy it is to write and develop such a program.

In *EZShoot* you control a cannon's movement at the base of the screen with the left and right arrow keys. Using the space bar as a trigger, you shoot at spacecraft that fly above. For each direct hit, you score 10 points. The craft crosses the screen in uneven distance and timing spurts, so staying in one place and firing won't result in hits every time.

The listing: `EZSHOOT`

```
1 POKE65497,0:ON BRK GOTO 17
2 HSCREEN2:HBUFF1,1900:HBUFF2,19
00:HBUFF3,1900:HCLS(8):HDRAW"C6;
BM100,50;R10F5R5D2L5G5L10E6H6":H
PAINT(110,55),6,6:HGET(100,50)-(
145,85),1:HDRAW"C7;BM200,100;D4R
3D4L5U4R3U4":HPAINT(201,105),7,7
:HGET(190,90)-(235,125),2
3 SO$="T255;12;11":S1$="T255;O2;
12;11"
4 HCLS8
5 FOR T=1TO2000
6 HGET(100,100)-(150,140),3
7 X1=160:Y1=170:Y2=30:SC=0
8 FOR C1=1 TO 20:F1=3
9 RD=RND(30):IF RD<15 THEN 9 ELS
E FOR X2=30 TO 270 STEP RD:HPUT(
X2,Y2)-(X2+44,Y2+28),1,PSET
10 II$=INKEY$:IF II$="" THEN II=
10 ELSEIF II$=" " THEN GOSUB 18
ELSE II=ASC(II$)
11 HPUT(X1,Y1)-(X1+50,Y1+40),3,P
SET
12 IF II=8 THEN X1=X1-16 ELSEIF
II=9 THEN X1=X1+16
13 HPUT(X1,Y1)-(X1+45,Y1+35),2,P
SET
14 HPUT(X2,Y2)-(X2+50,Y2+40),3,P
SET
15 NEXT X2
16 NEXT C1
17 HPRINT(10,15),"AGAIN (Y/N) <E
NTER>? ":LINE INPUT AN$:IF AN$="
Y" THEN 4 ELSE POKE65496,0:END
18 F1=F1-1:IF F1<0 THEN RETURN E
LSE PLAY SO$:FOR YY=Y1-10 TO Y2
STEP -30:HSET(X1+10,YY,1):IF HPO
INT(X1+9,YY)=6 OR HPOINT(X1+11,Y
Y)=6 THEN GOSUB20 ELSE HSET(X1+1
0,YY,8):NEXT
19 RETURN
20 HCIRCLE(X1+15,YY-2),10,7:HPAI
NT(X1+10,YY),7,7:FOR CT=1 TO 10:
PLAYS1$:NEXT:HPUT(X1-20,YY-20)-(
X1+30,YY+20),3,PSET:SC=SC+10:HPR
INT(10,1),"SCORE":HCOLOR8,8:HPRI
NT(20,1),SC-10:HCOLOR7,8:HPRINT(
20,1),SC:RETURN
```

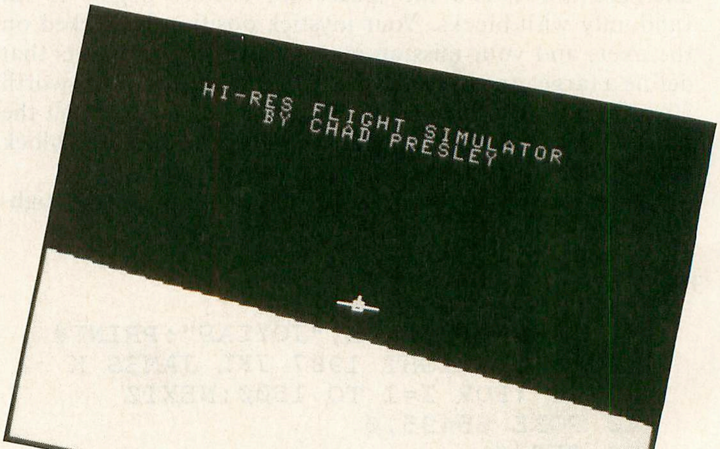
Simulation

Winging It

CoCo 3

By Chad Presley

Who would have thought that a CoCo 3 could take flight in so few lines of BASIC coding? Well, with this little flight simulator you can't do dogfights and you can't drop bombs, but you can experience the illusion that you are actually in the cockpit of a plane, diving and turning. Just plug in your right joystick and take to the air.



The listing: `FLIGHT`

```
10 ONBRKGOTO190
20 REM  HI-RES FLIGHT SIMULATOR
30 REM       BY CHAD PRESLEY
40 POKE65497,0:A=87:B=87
50 HSCREEN2:HCLS14:HCOLOR3
55 HCOLOR0:HLINE(0,10+A)-(320,10
+B),PSET:HPAINT(0,100),0
```

```
60 HCOLOR1:HPRINT(8,0),"HI-RES F
LIGHT SIMULATOR":HPRINT(12,1),"B
Y CHAD PRESLEY":HCOLOR8:HLINE(0,
25)-(320,25),PSET
70 H=JOYSTK(0):V=JOYSTK(1)
80 IFA=15THENA=A+1ELSEIFA=170THE
NA=A-1
90 IFB=15THENB=B+1ELSEIFB=170THE
NB=B-1
100 IFH>43THENA=A-1
110 IFH<23THENA=A+1
120 IFV>43THENB=B+1
130 IFV<23THENB=B-1
140 HCOLOR0:HLINE(0,10+A)-(320,1
0+B),PSET
150 HCOLOR8:HLINE(0,9+A)-(320,9+
B),PSET
160 HLINE(0,6+A)-(320,6+B),PSET
170 HCOLOR4:HDRAW"BM170,96;L20;R
10;U5":HCIRCLE(160,96),3
180 SOUNDA+B/2,1:GOTO70
190 POKE65496,0:END
```

Mind Game

4K

What's Missing?

By Keiran Kenny

You never miss something until it's gone, the saying goes. With this game you'll find it's hard to *remember* something when it's gone.

This program allows you to test and train your memory. After you have given the program a difficulty level as prompted (a range from two to 10), the screen displays rows of random letters, which you must study until you think you have them memorized. Then test yourself by pressing any key. One of the rows will disappear, and you will be asked to type in what you think it was. The computer will tell you if you are right or wrong and will keep track of your score.

The listing: MEMORY

```
10 CLS:GOTO30
20 K$=INKEY$:IFK$=""THEN20ELSERE
TURN
30 PRINT@40,"<<<MEMORY>>>"
40 PRINT@96,"BY KEIRAN KENNY, TH
E HAGUE, 1987"
50 PRINT@192,"SET DIFFICIULTY LE
VEL:"
60 PRINT@260,"";:INPUT"NO. OF RO
WS (2-10):";NR
70 IFNR<2ORNR>10THENPRINT@256,""
:GOTO60
80 PRINT@324,"";:INPUT"NO. OF LE
TTERS (2-6):";NL
90 IFNL<2ORNL>6THENPRINT@324,"":
GOTO80
100 PRINT:PRINTTAB(6)"PRESS ANY
KEY.":GOSUB20
110 CLS
120 P=34
130 FORN=1TONR
140 FORT=1TONL
150 R=64+RND(26)
160 A$=CHR$(R)
170 PRINT@P,A$;
180 B$=B$+A$
190 P=P+1
200 NEXT
210 C$(N)=B$:B$=""
220 P=P+32-NL
230 NEXT
240 PL=PL+NR*NL
250 K$=INKEY$
260 P=32:PP=P*(NR+2)+2
270 PRINT@PP,"WHEN READY, PRESS
ANY KEY.":GOSUB20
280 N=RND(NR)
290 IP=P*N:PRINT@IP,""
300 PRINT@PP,"<ENTER> THE MISSIN
G ROW."
310 PRINT@IP,"";:INPUTD$
320 PRINT@IP+NL+3,"";:IFD$=C$(N)
THENPRINT"RIGHT!":RT=RT+NR*NL EL
SEPRINT"WRONG! IT WAS "CHR$(34)C
$(N)CHR$(34)
330 PRINT@PP,"SCORE:"RT;CHR$(8)"
! POSSIBLE:"PL;CHR$(8)"."
340 SC=SC+1:IFSC/5=INT(SC/5)THEN
PRINT@PP+64,"CHANGE DIFFICULTY L
EVEL? Y/N"ELSE390
350 GOSUB20
360 IFK$="Y"THENCLS:GOTO50
370 IFK$="N"THENCLS:GOTO120
380 GOTO350
390 PRINT@PP+70,"PRESS ANY KEY."
:GOSUB20
400 CLS:GOTO120
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

Interpreting a newspaper delivery chart

Carrier's Collection Chart

By Steve Blyn
Rainbow Contributing Editor

Delivering newspapers and fliers for local stores is a popular way of earning money for many preteens and teen-agers in our area. They opt for this kind of job because it allows them to work close to their homes, and also affords them the opportunity to be "their own boss." One of the essentials these junior entrepreneurs soon discover is that it is vital to keep good records on their customers. This month's article presents a portion of a collection chart teens could use for their newspaper delivery routes.

Newspaper carriers ordinarily prepay for their newspapers. Of course, they pay a lower price than the one printed on the newspaper. Money is made both from tips and the difference in the amount that carriers pay and later receive for the newspapers. We are concerned with figuring out how to read such a chart and to determine how much money to collect.

There are only eight names on our sample collection list. (We would hope this represents only a small portion of a carrier's true list.) When using `DATA` statements of less than 10 elements, it is unnecessary to use a `DIM` statement. Line 40 is therefore able to read in the eight customer names, which are contained in the one `DATA` statement in Line 280. Line 80 prints these names on the screen. You can alter these to more creative or meaningful names in your program.

Line 50 asks for user input. The student may select a real or imaginary price for the newspaper. This becomes Variable `W`. Arbitrarily we decide to double the daily price to create a Sunday edition price, which becomes Variable `SU`.

We feel that this user input feature is a key element to the program; it can be used in various ways. You could insist that students select realistic prices, which could lead to a social studies discussion of newspaper pricing. For example, the 5-cent newspaper of my youth now costs 35 cents. On the other hand, you could encourage unrealistic price selections to create a greater variety of possible arithmetic examples.

Not all customers order the newspaper every day of the week. Some want delivery only on the weekdays, and some may want only the weekend editions or just the Sunday paper. Lines 100 through 140 offer five different sequences of delivery days customers may have to choose from. A plus sign indicates that the paper is ordered on that day. The delivery schedule for each customer is chosen randomly each time the program is run. This helps create interest and eliminates memorization.

The student's task is to compute the amount each customer owes him for the week. The correct answer is represented by Variable `TT`; the user's answer is represented by Variable `Q`. Line 200 asks the student to input an answer. Lines 210 through 230 then compare the two answers and inform the student whether or not the answer is correct.

After each example, the student presses ENTER to go on to the next example. After each set of eight, the student should press either the E key to end the program or the ENTER key to begin again.

Line 240 always prints the correct answer on the chart, whether or not it was answered correctly. You might care to examine the chart with the student at the end of each set of eight examples. You might, for example, ask which customer owes the most or the least amount of money. Perhaps you might ask for the total of the eight customers. Another idea is to make up a price paid for the papers vs. the price collected to determine the profit. Including imaginary tips would be even more realistic. These are only a few of the ideas that may evolve from the information printed on the screen during the course of the program.

As usual, we encourage you to modify our programs for use in the ways that best suit your child's or student's needs. We, at Computer Island, always enjoy hearing from our readers. □

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: `NEWSCOST`

```
10 REM NEWSPAPER DELIVERY ROUTE
20 REM STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1988
30 CLEAR 1000:P$=STRING$(32,131)
:CLS
40 FOR T= 1 TO 8:READ A$(T):NEXT
 T
50 PRINT"HOW MANY CENTS IS A DAI
LY         NEWSPAPER THIS WEEK";:I
NPUT W:SU=W*2
60 CLS:PRINT@0,"SALES: DAILY=";W
;"  SUNDAY=";SU
70 PRINT@32,P$;
80 FOR T=1 TO 8:PRINT@128+M,A$(T
):M=M+32:NEXT T
90 IF X=256 THEN RUN ELSE R=RND(
5):PRINT@384,STRING$(126," ");
100 IF R=1 THEN B$="+ + + + + +
+":TT=6*W+SU
```

```
110 IF R=2 THEN B$="+ + + + + +"
:TT=6*W
120 IF R=3 THEN B$="+ + + + +":T
T=5*W
130 IF R=4 THEN B$="          +
+":TT=W+SU
140 IF R=5 THEN B$="+ + +
+":TT=3*W+SU
150 PRINT@64,"NAME          M/T/W/T
/F/S/SU=TOTAL"
160 PRINT@96,P$;
170 PRINT@384,P$;
180 TT=(TT/100)
190 PRINT@139+X,B$;
200 PRINT@416,"WHAT IS THE TOTAL
? $";:LINEINPUT Q$
210 Q=VAL(Q$):X=X+32
220 IF INT(Q*(100+.05))=INT(TT*(
100+.05)) THEN PRINT@460,"CORREC
T":SOUND 220,2:GOTO 240
230 PRINT@448,"SORRY, THE ANSWER
 IS ";:PRINT USING"$#.##";TT
240 PRINT@153+X-32,"";:PRINT USI
NG"$#.##";TT
250 PRINT@485,"PRESS ENTER TO GO
 ON";
260 EN$=INKEY$
270 IF EN$=CHR$(13) THEN 90 ELSE
 IF EN$="E" THEN 290 ELSE 260
280 DATA JONES,SMITH,MARTIN,ROSS
,PEARL,BELL,SCOTT,GOLD
290 CLS:END
```

Two-Liner Contest Winner . . .

A classic pong-type game for two players, with an added obstacle in the center. Use the joysticks to keep the ball in play. For super-pro speed, use a speed-up poke.

The listing:

```
0 READF,G,T,O,C,D,A,B,N,S(1),S(3
),O(1),O(3):PMODE1:PCLS:LINE(0,0
)-(T,O),PSET,B:COLOR2:SCREEN1:FO
RI=1TON:FORJ=0TO3:E(J)=JOYSTK(J)
:NEXT:FORJ=1TO3STEP2:E=E(J)*2.58
+2:IFE<>O(J)THENLINE(S(J),O(J))-
(S(J),O(J)+25),PRESET:LINE(S(J),
E)-(S(J),E+25),PSET
1 O(J)=E:NEXT:PSET(A,B,H):A=A+C:
B=B+D:H=PPOINT(A,B):IFH=2THENPLA
Y"T40G":POKE65495,0:C=-C:NEXTELS
EIFH=4THENPLAY"T40G":D=-D:NEXTEL
SEIFA<10THENSOUND100,9:RUNELSEIF
A>245THENSOUND100,9:RUNELSEPSET(
A,B,2):NEXT:DATA1,1,255,191,8,8,
128,96,9999,232,24,5,5
```

Michael Toepke
Oak Harbor, WA

(For this winning two-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

DINO PICTURE DATA BASE- 194 Dinosaurs! Names, areas, latin meanings, time periods, pull down menu, world map on screen. Powerful, colorful, educational. COCO3 29.95

Build your own coin-operated Video Game using the COCO! Complete instruction book with plans, schematics, parts sources. All software provided and includes a 4 in 1 video game that you can use. COCO 1 and 2. DISK 29.95

COCO 3, TOO!

Autoboot your computer- This hardware project will RUN a program as soon as the COCO is turned on, without you having to touch the keyboard! Schematics and instructions only 9.95 COCO1 and 2. Will work on most switch matrix type computers.

FRAZE CRAZE- Wheel a fortune with this popular word game. COCO 1,2 64K or COCO3. 14.95 DISK

THE MEMORY GAME-Flip a card and see if you can find its match. With basic shapes for younger players, all the way up to intricate shapes for those with CONCENTRATING minds. A beautiful family game! COCO3, Joystick, Disk 19.95

Why go to RENO? Now you can enjoy the excitement of a Casino style game with BIG CITY KENO! Be a big winner on the COCO3, Disk, 19.95

CHECK, MONEY ORDER OR C.O.D. IN U.S. FUNDS TO RAM ELECTRONICS
814 JOSEPHINE, MONMOUTH, OREGON PHONE NUMBER 503-838-0139

DON'T JUST DUMP YOUR "PMODE4", "PMODE3" GRAPHICS...

Expand, shrink & stretch 'em with ZOOMDUMP

ZOOMDUMP requires an ext. BASIC CoCo & DMP-105 or compatible printer. Print out "PMODE4" or "PMODE3" graphics screens to within a fraction of an inch of any height or width you specify -- up to 7.8" wide, in normal or negative image. MAKE YOUR GRAPHICS DUMPS FIT THE JOB -- NOT VICE VERSA!

Specify tape or disk. Send check or money order for $14.00* to:

CODIS ENTERPRISES
2301-C Central Dr., Ste. 684
Bedford, TX 76021

Sample printouts available upon request if return postage provided.

*Texas residents add 7% sales tax.

Wondering what to do with that stack of RAINBOW back issues?

The "Encyclopedia CoColoria"

By Joseph Kolar
Rainbow Contributing Editor

Throughout my adult life I've hummed to my tone-deaf self, "Once in the dear, dead days beyond recall/ When on the earth the mists began to fall." This scrap of verse was all I remembered of that old song, but it stuck in my mind like glue.

Back in the dim '30s when I was struggling through the Big Apple's P.S. 82, during a rudimentary music appreciation class an old Irishman came to teach us a song he had composed. I was impressed because he was a composer; no VIPs ever came within the purview of our self-contained ethnic neighborhoods, and nobody at all ventured to bother with grimy, runny-nosed kids.

You must wonder what this has to do with THE RAINBOW!

A friend of mine who had recently bought an expensive electronic organ had gone up North for the Christmas holidays. Left to my own devices, I wondered if there were any music programs that might be of value to her and help her comprehend music theory, etc. I checked out my personal hoard of programs but found it wanting.

What do you do when you want to find a program suitable for your needs? Silly question — you consult the back issues of THE RAINBOW! Everybody knows that June is the Music Issue of THE RAINBOW, so that's where I headed.

I looked through the June '87 issue to see what I could find. I noticed some articles referring to a *Music+* program. I filed that information away in my mind, took down all my June issues from '83 onward and leafed through them.

A chord identification program in the June '84 issue caught my eye, and I duly copied the listing. Hungry for more music theory material, I reverted to the June '87 issue and copied a program that allows you to play the CoCo as a two-level organ. From the '86 issue, I pulled another goodie.

In doing all this *pro bono* work I began to generate some interest of my own in what the programs promised . . . and did.

Repairing to the June '87 issue, I read most of the articles. There was a tempting musical synthesizer program, but the listing appeared daunting; even though it promised four-voice harmony, I was chicken.

Joseph D. Platt's article intrigued me. It offered transposition refinements for *Music+*. Naturally, it meant nothing to me, but in his article he referred to Bill Ludlum's *Music+* program in the Music issues of '84 and '86. Back to the June '86 issue! Bob Ludlum's article had to do with improvements to his *Music+* program. Back further to the June '84 issue! In this article Ludlum wasted no time listing the forerunners of his program; he referred to the December '83 issue as the immediate basis of *Music+* and urged readers to refer to Larry Konecky's *CoCo Composing* program.

Do you begin to see how useful RAINBOW's back issues are to a CoCo owner? Think of all the material at hand that will never get stale. Since your interests may change or expand, back issues and the yearly index of articles in July's Anniversary Issue is a readily available pool of information.

Tracking down *Music+* led me to the June '84 issue for good. I compared it with Larry's program in the December '83 issue and found it so tempting that I keyed it in. What satisfaction! It allowed me, a tone-deaf, musical-instrumentless klutz to copy and create music. Following the rule that nothing breeds success like success, I returned to the '86 Music Issue and copied what refinements were listed. Then off to the '87 Music Issue to incorporate Joseph Platt's enhancements to the *Music+* program.

This musical odyssey was really getting me hooked. Here I was, with no musical instrument, copying a music score and creating creditable music in four-voice harmony. I couldn't get over it! As I played some of my home-grown selections, I kept looking around for the orchestra.

Without the back issues of THE RAINBOW I would not have been able to accomplish this feat.

That music synthesizer program was luring me onward. Even though I had a perfectly good four-voice program, I decided to copy the listing offered by Matthew Thompson in the June '87 issue (Page 58). This program, titled *Bells and Whistles 2*, was claimed by its author to be "one of the best-sounding all-software music synthesizers for the CoCo" in the entire world as of December, 1986. It was a toughie to copy, and then I couldn't get it to work properly.

Persistently I looked through a few issues after June's, just in case there were corrections to the program; none were offered. OK, then it must be my error. Here's another valuable use of the back issues: I usually wait a few months before I attempt to copy a listing to make sure no corrections are necessary.

I checked the program over and over again, character by character, and that gets mind-boggling; still, I had a self-made error extant that I had to find. And one evening, I did find it; in the machine language section, I had copied "36" instead of "E6." This solved the problem and *voila*, I was in business.

I love this program and the world it has opened for me. The *Bells and Whistles 2* program, by a then 16-year-old, does what it claims. The text accompanying the article has no fluff or space-fillers; every sentence means something, and if you skip a line valuable information is overlooked.

As good as the program is, I am sure in June '89 or some following year, improvements will be made and offered in THE RAINBOW. Someday these future issues will be back issues and will contain valuable material. If that article in the hypothetical future issue intrigues your curiosity and you have saved all

---

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

your back issues, you will be able to refer diligently to whatever titillates your fancy at that moment.

I have noticed that it is possible to change the Envelope/Waveform setting in the four voices by locating the cursor over the proper voice in the E/W column and using the octal number to replace the old data. For instance, if you type 24 in the desired voice, 3,0 will result. 24 is equal to octal 30, or in this case Envelope 3, Waveform 0. I found this to be very convenient when experimenting with various sounds to get the right mix for a particular song.

We CoCo users have little opportunity to use octal code, but here is one time it becomes useful. Simply rule out several columns and lines, marking the top line and the first column 0 through 7. Then fill in the boxes horizontally from 0 through 63. The information inside is equivalent to the vertical scale augmented by the horizontal scale. Thus to get Voice 1,1: Plot the vertical 1, then the horizontal 1; where they cross you find the value 9, which calls octal 11 or 1,1.

One oddity I spotted is that although at any given instance you can have no more than eight envelopes and eight waveforms, you can get some dissonant but curious effects. You would think that 63, which translates to octal 77, would be the highest value you could type in. You can, however, type in a value up to 255, even though the resultant value shown in the E/W column is kind of weird. You might get a character other than a numeral or letter as the E value. Thus, you might get :4 or B2 or 90 — obviously typing errors. Still, odd sounds are created. If only one voice has this pseudo-value, the resultant four-voice harmony might be acceptable if odd sounds are your game. This is beyond my talent, but somebody might investigate this anomaly.

At any rate this program allows you to create all kinds of sounds. Practice in copying sheet music is one great self-teaching aide. In short order, you learn to read music. Then you begin to understand time, tempo and volume mixing. Then you begin to learn what notes to discard when more than four are listed in a location. And the first thing you know, you're looking for eight-voice harmony. This leads to special software and hardware — to get mired deeper and deeper in this musical quicksand. Then you get to wondering about MIDI, a whole new ballgame. (See the MIDI tutorial by John E. Mueller in the June '87 RAINBOW, Page 36).

Bells and Whistles 2 is a great aide in teaching newcomers to music what the correct beat should be and what the song should sound like. All this flirting with music has me so enthusiastic that I have bought an organ keyboard with MIDI capabilities. Someday I will get into MIDI; but right now with the help of Matthew Thompson's super program, I have to learn to play the keyboard.

> ***"You will find that your interests expand or change with time; programs that you ignore as useless today, you may seek eagerly at a future date."***

Recently, I went to the library to rustle up some music to copy using my new tool. I came across a 1930-vintage songbook, and lo and behold! I found the song that had been rattling around in my brain all these years. It was "Love's Old Sweet Song" by J. L. Molloy. As soon as I keyed in the first few bars and ran it, a little part of my youth returned. I wonder what Mr. Molloy would say if he were around to hear me play his song just the way he wrote it, without a musical instrument? If I could go back to that classroom knowing what I know now, how could I explain to Mr. Molloy that a good 50 years later, without any musical training or inclination, I would be playing his song, in four voices, on a computer? How could I explain the CoCo without his calling the looney bin to have me carted away as a raving maniac?

Squirreling away all your copies of THE RAINBOW is one of the wisest actions you can take. If you are a relative newcomer to CoColand, you should make it a point to buy all the back issues that pertain to your personal fields of interest. Fortunately, it is no problem to determine which months you require. The annual anniversary issues contain the index for the year's cornucopia of programs. It is an expensive outlay to get all the issues, so work backwards and get the more recent ones you lack. Add them to your reference library. You will find that your interests expand or change with time; programs that you ignore as useless today, you may seek eagerly at a future date.

Let me give you an example. I was never much interested in disk programs, mainly because I didn't own a disk drive. But when I finally did get one, suddenly I wanted a good program for business files. Guess where I found a premier program? In THE RAINBOW! Beginning with the July '84 issue ("Database Delight," Page 64), a six-part database tutorial by Bill Nolan taught me the rudiments of developing a database manager program. I had doubted the possibility of finding a suitable program, and here were six tutorials lying on my shelves! Though dated in time, they are just as useful today as in the summer of '84 when I flipped past them without a second glance.

How much are all these back issues worth? To me, they are equivalent to an "Encyclopedia CoColoria." Priceless information is available upon demand.

As more and more of the back issues become unavailable, all the wisdom contained therein will be lost to you. So, the corollary is: Don't let your subscription lapse. I have talked to CoCo owners who sadly state that they have dropped THE RAINBOW — incredible to me, because as CoCo owners they put themselves at a severe disadvantage without the wealth of information stored in the magazine. They may have saved a few bucks, but they are the poorer for it.

You old CoCo veterans who have read my articles since December '82 must have heard all this before. Still, the cheapest, most valuable reference tool is in your hands at this moment. Never, never throw away any issue — you'll be sorry!

Beginning next month I'll be presenting a series of 20 articles devoted to graphics. This material was written for the granddaddy CoCo, but it is just as valid today on CoCos 2 and 3. The articles could make a good-sized book of tutorials. You may find them valuable at some time in the future — when they will be buried in back issues!

I hope you haven't minded this month's absence of listings. If you keep in mind the message I've presented instead, you will have been well served.

RAINBOW

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

For greater convenience, your high scores may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`.

★ Current Record Holder • Shutout

ADVANCED STAR*TRENCH (THE RAINBOW, 7/86)

4,750	★Stephane Martel, Laval, Quebec
4,475	David Schaller, Clarkston, WA
4,500	Frankie DiGiovanni, Olney, MD
4,300	Jeffrey Warren, Waynesville, NC
3,960	Maurice MacGarvey, Dawson Creek, British Columbia

ASTRO BLAST *(Mark Data)*

48,825	★Tony Bacon, Mt. Vernon, IN

BEE ZAPPER (THE RAINBOW, 9/87)

15,785	★David Hartmann, Osoyoos, British Columbia
12,825	Frederick Lajoie, Nova Scotia, Canada
12,350	Tom Carpenter, Palenville, NY
12,175	Sara Mittelstaedt, Kiel, WI
11,675	Daniel Hartmann, Osoyoos, British Columbia
11,075	John Valentine, Marlborough, CT
10,850	Matthew Yarrows, Easthampton, MA
10,700	Kevin Pereira, Corsicana, TX

BOUNCING BOULDERS *(Diecom Products)*

10,930	★Patrick Garneau, Ste-Croix, Quebec

CANYON CLIMBER *(Radio Shack)*

1,725,100	★John Guptill, Columbia, MO
1,627,500	Matthew Fumich, Munford, TN
213,400	Sara Mittelstaedt, Kiel, WI
202,000	David Brown, New Waterford, Nova Scotia
178,200	Darren King, Yorkton, Saskatchewan

CASHMAN *(MichTron)*

9,870	★Martin Parada, Arcadia, CA

CLOWNS & BALLOONS *(Radio Shack)*

688,960	★Faye Keefer, Augusta, GA
217,500	Frankie DiGiovanni, Olney, MD
70,180	Charles Andrews, Delta Jct, AK
36,650	Melody Webb, Lakeport, CA
33,710	Timm Cappell, Freeland, MI

COLOR BASEBALL *(Radio Shack)*

238-0	★•John Valentine, Marlborough, CT
119-0	•Adam Silverstein, Chicago, IL
111-2	David Czarnecki, Northhampton, MA
96-0	•Chad Blick, Irwin, PA
43-0	•Jason Kopp, Downs, IL

COLOR CAR *(NOVASOFT)*

316,550	★Alan Martin, Cornwall, Ontario
113,970	Chad Blick, Irwin, PA
110,870	Martin Parada, Arcadia, CA

COLOR POKER (THE RAINBOW, 4/83)

44,022,600	★Earl Foster, Lynchburg, VA

DALLAS QUEST *(Radio Shack)*

81	★Brad Wilson, Lithia Springs, GA
85	Paul Summers, Orange Park, FL
85	David and Shirley Johnson, Leicester, NC
86	Roy Grant, Toledo, OH
86	Melanie Moor, Florence, AL
87	Andrew Yarrows, Easthampton, MA
87	Douglas Bell, Duncan, OK
102	Hugh Flournoy, Jr., Spanaway, WA

DEF MOV (THE RAINBOW, 1/87)

43,806	★Domingo Martinez, Miami, FL
35,331	David Schaller, Clarkston, WA
31,673	Douglas Bacon, Middletown, CT
30,753	Pasha Irshad, Silver Spring, MD
30,326	Frederick Lajoie, Nova Scotia, Canada

DEMON ATTACK *(Imagic)*

279,435	★Jon Hobson, Plainfield, WI
202,260	Tom Briggs, Hillsdale, NY
89,285	Upton Thomas, Arnold, MD
72,410	Glenn Hodgson, Aberdeenshire, Scotland
67,760	Jim Davis, Sandwich, IL

DESERT PATROL *(Arcade Animation)*

234,300	★Steven Turcotte, Matane, Quebec

DESERT RIDER *(Radio Shack)*

80,703	★Thomas Payton, Anderson, SC
65,351	Jason Hackley, Clinton, CT
64,789	Roby Janssen, Clear Lake, IA
63,014	Rebecca Henderson, Ballston Spa, NY
62,702	William Currie, Bryans Road, MD
50,797	Patrick Devitt, Lombard, IL
47,677	Thomas Beall, Odenton, MD
33,498	Brian Anderson, Clear Lake, IA

DEVIL ASSAULT *(Tom Mix)*

1,866,100	★Stephane Martel, Laval, Quebec
623,550	Dale Krueger, Maple Ridge, British Columbia
75,000	Blake Cadmus, Reading, PA
40,800	Benoit Landry, Drummondville, Quebec

DONPAN *(Radio Shack)*

53,100	★Jim Davis, Sandwich, IL
52,600	Eric Olson, Wheaton, IL

DOWNLAND *(Radio Shack)*

99,980	★Danny Wimett, Rome, NY
98,985	Karl Gulliford, Summerville, SC
97,740	Stephane Deshaies, Beloeil, Quebec
89,490	Neil Edge, Williston, FL
77,254	Tom Audas, Fremont, CA
73,346	Jean-Francois Morin, Loretteville, Quebec
70,142	Chris Goodman, Baltimore, MD
68,142	Cooper Valentin, Vavenby, British Columbia
67,721	Keith Yampanis, Jaffrey, NH
62,442	Eddie Lawrence, Pasadena, Newfoundland
55,300	Patrico Gonzalez, Buenos Aires, Argentina
49,500	Danny Perkins, Clifton Forge, VA
49,441	Kevin Pater, Port Alberni, British Columbia
49,254	David Brown, New Waterford, Nova Scotia
43,502	Mike Ells, Charlotte, MI
43,369	Jason Kloostra, Jenison, MI
41,896	Antonio Hidalgo, San Jose, Costa Rica
40,360	Jesse Binns, Phoenix, AZ
35,611	Adam Broughton, Morris, PA
35,169	Daniel Norris, New Albany, IN
23,649	Jim Herr, Newton, WI
22,366	Tommy Herr, Newton, WI
19,579	Steven Turcotte, Matane, Quebec

DRAGON FIRE *(Radio Shack)*

160,835	★Eric Olson, Wheaton, IL
146,325	Stephane Martel, Laval, Quebec
11,726	Marcos Rodriguez, New York, NY
9,861	Michael Adams, Columbia, SC
9,200	Jesse Cogdell, Wilmington, DE

ENCHANTER *(Infocom)*

400/223	★Konnie Grant, Toledo, OH

ESCAPE 2012 *(Computerware)*

202	★Roy Grant, Toledo, OH
199	Milan Parekh, Anaheim, CA

FIRESTORM (THE RAINBOW, 1/86)

22,505	★Chad Presley, Luseland, Saskatchewan
11,250	Stephane Martel, Laval, Quebec
5,680	Kathy Rumpel, Arcadia, WI
3,760	Rick Beevers, Bloomfield, MN
3,505	Blake Cadmus, Reading, PA

GALACTIC ATTACK *(Radio Shack)*

31,100	★Upton Thomas, Arnold, MD
29,030	David Czarnecki, Northhampton, MA
26,370	Jeff Remick, Warren, MI
22,250	Dave Staub, Moundsville, WV
11,830	Sheldon Penney, Green Bay, Newfoundland

GALAGON *(Spectral Associates)*

751,020	★Sofia Giorgi, Brasilia, Brazil
357,890	Jason Clough, Houston, TX
328,820	Bernard Burke, Lee's Summit, MO
249,960	Matthew Fumich, Munford, TN
169,410	Danny Dunne, Pittsfield. NH

GANTELET *(Diecom Products)*

45,235,820	★Ken Hubbard, Madison, WI
23,643,720	Geran Stalker, Rivordalo, GA
20,921,490	Randall Edwards, Dunlap, KS
10,222,940	Clinton Morell, Sacramento, CA
7,493,340	Stirling Dell, Dundalk, Ontario

GHANA BWANA *(Radio Shack)*

2,350,750	★Michael Heitz, Chicago, IL
702,520	Joseph Delaney, Augusta, GA
105,820	David Reash, Hadley, PA

GIN CHAMPION *(Radio Shack)*

1,120-0	★•Kim Johns, Port Cog., British Columbia

GROBOT *(Children's Computer Workshop)*

8,090	★Curt Lebel, Louisville, KY

HITCHHIKER'S GUIDE TO THE GALAXY *(Infocom)*

400/359	★Roy Grant, Toledo, OH
400/422	Jeff Holtham, Waterloo, Ontario
400/510	Brad Wilson, Lithia Springs, GA

INTERBANK INCIDENT *(Radio Shack)*

4,861	★Shara and Chris Euton, Lilburn, GA

IRON FOREST *(Diecom Products)*

3,173,200	★Charles Boyd, Amarillo, TX
2,676,300	Janet Boyd, Amarillo, TX
1,141,650	Craig Pennell, Amarillo, TX
1,013,100	William Weller, Kailua, HI
595,700	Daniel Wibier, Santa Rosa, CA

JOKER POKER (THE RAINBOW, 3/87)

43,616,750	★Carole Rueckert, Mansfield, OH
8,179,710	Brenda Kim, Athens, OH
3,796,898	Curtis Trammel, Murphysboro, IL
2,793,285	Blain Jamieson, Kingston, Ontario
205,239	Paul Dykes, Baton Rouge, LA
18,889	Frankie DiGiovanni, Olney, MD

JUNIOR'S REVENGE *(Computerware)*

2,503,000	★Stephane Martel, Laval, Quebec
257,600	Keith Cohen, Rocky Mount, NC

KARATE *(Diecom Products)*

31,000	★Wayne Hufford, Kincardine, Ontario
21,800	Daniel Hartmann, Osoyoos, British Columbia
11,600	Jonathon Ross, Pocomoke City, MD
6,300	David Darling, Longlac, Ontario
5,600	Steven Turcotte, Matane, Quebec

KORONIS RIFT *(Epyx)*

186,710	★Tony Harbin, Cullman, AL
184,180	Russell Johnson, Sarnia, Ontario
184,120	John Farrar, Lebanon, TN
174,810	Donald Cathcart, Halifax, Nova Scotia
133,990	Paul Blessing, Spring, TX

KUNG-FU DUDE *(Sundog Systems)*

32,000	★Tony Geitgey, University Park, PA

SCOREBOARD

12,150 Cody Deegan, Fallon, NV
THE LAIR *(Freebooter Software)*
112,940 ★James Walton, Pittsburgh, PA
LUNAR RESCUE (THE RAINBOW 8/87)
260,427 ★Tom Beeker, Gracey, KY
259,493 Cody Deegan, Fallon, NV
255,625 John Valentine, Marlborough, CT
246,668 Phillip Holsten, Modesto, CA
175,771 Jim Davis, Sandwich, IL
LUNAR-ROVER PATROL *(Spectral Associates)*
37,890 ★Dave Staub, Moundsville, WV
30,000 Vincent Tremblay, Matane, Quebec
MAGIC OF ZANTH *(Computerware)*
31 ★Paul Summers, Orange Park, FL
44 Matthew Smith, Courtenay, British Columbia
45 Michael Green, Ware, MA
47 Robert Williams, Yellowknife, Northwest Territory
MEGA-BUG *(Radio Shack)*
9,016 ★Heather Richwalski, Medford, WI
8,199 Eric Mellon, Newark, DE
6,404 David Hartmann, Osoyoos, British Columbia
5,960 Mary Jensen, El Cajon, CA
5,528 Douglas Bacon, Middletown, CT
MEMOCARDS (THE RAINBOW, 8/87)
1,418 ★Edward Kavanaugh, North Easton, MA
1,414 Sara Mittelstaedt, Kiel, WI
MISSION: F-16 ASSAULT *(Diecom Products)*
468,750 ★Karen Jessen, Cleveland, OH
355,570 Stirling Dell, Dundalk, Ontario
318,160 Jeremy Pruski, Sandwich, IL
144,510 Donald Cathcart, Halifax, Nova Scotia
137,920 Mike Grant, Fresno, CA
MUNCHKIN BLASTER (THE RAINBOW, 8/87)
11,950 ★Jim Davis, Sandwich, IL
10,420 Gabe Emerson, Baraboo, WI
9,760 Tom Beeker, Gracey, KY
9,270 Edward Kavanaugh, North Easton, MA
9,080 John Weaver, Amsterdam, NY
ONE-ON-ONE *(Radio Shack)*
1,302-0 ★●Thomas Payton, Anderson, SC
1,276-0 ●Jonathan Dorris, Indianapolis, IN
1,260-0 ●Brandon Reece, Chickamauga, GA
1,242-0 ●William Currie, Bryans Road, MD
1,210-0 ●Gregg Thompson, Chesterfield, VA
OUTHOUSE *(MichTron)*
38,640 ★Dave Staub, Moundsville, WV
PAC PANIC *(Cougar)*
34,950 ★Heather Hamblen, Bar Harbor, ME
PINBALL *(Radio Shack)*
1,139,450 ★Benoit Landry, Drummondville, Quebec
399,350 Troy Stoll, Washington, IN
389,463 Thomas Payton, Anderson, SC
213,300 Patrick Martel, Laval, Quebec
142,400 Thomas Payton, Anderson, SC
PITFALL II *(Activision)*
197,048 ★Keith Catrett, Montgomery, AL
159,400 David Cornette, Green Bay, WI
104,479 David Stewart, Kent, OH
PITSTOP II *(Epyx)*
54 ★Rusty Breitbach, Rickardsville, IA
54 ★Jeff Coburn, Easton, PA
54 ★Walter Hearne, Pensacola, FL
54 ★Sean Noonan, Green Bay, WI
54 ★Thomas Payton, Anderson, SC
54 ★Jeff Szczerba, Sturtevant, WI
54 ★Brad Wilson, Lithia Springs, GA
51 Christian Grenier, Valleyfield, Quebec
49 Randy Venable, Coal City, WV
14 Eric Mellon, Newark, DE
9 Laundre Clemon, Sacramento, CA
POOYAN *(Datasoft)*
236,650 ★Jeff Mrochuk, Edmonton, Alberta
111,600 William Cathey, Kings Mtn., NC
POPCORN *(Radio Shack)*
105,560 ★Heather Condit, Grafton, ND
26,889 Claude Jalbert, Matane, Quebec
20,800 Kristopher Santos, Laurel, MD
PYRAMID *(Radio Shack)*
220 ★Jason Ebbeling, Berkshire, MA
PYRAMID 2000 *(Radio Shack)*
220 ★Darren King, Yorkton, Saskatchewan

125 Chris VanOosbree, Emmetsburg, IA
100 Peter Antonacopoulos, Toa Baja, Puerto Rico
PYRAMIX *(ColorVenture)*
67,850 ★Richard Winkelbauer, Bronx, NY
56,970 Andy Freeman, Turtle Lake, WI
37,500 Matthew Smith, Courtenay, British Columbia
26,900 Todd Kopke, Glendale Heights, IL
20,120 Lori Curran, La Porte City, IA
QUIX *(Tom Mix)*
8,407,772 ★John Haldane, Tempe, AZ
1,404,000 Curtis Goodson, Sao Paulo, Brazil
1,201,383 Milan Parekh, Anaheim, CA
1,003,104 Elisa Goodson, Sao Paulo, Brazil
326,192 Martin Parada, Arcadia, CA
RESCUE ON FRACTALUS *(Epyx)*
1,000,948 ★Steven Ujvary, Calgary, Alberta
323,167 Kenneth Hill, Severna Park, MD
292,633 David Richards, Huntington, WV
288,084 Donald Cathcart, Halifax, Nova Scotia
270,000 Russell Johnson, Sarnia, Ontario
RETURN OF THE JET-I *(ThunderVision)*
336,563 ★Jesse Collicott, Inman, KS
RETURN OF JUNIOR'S REVENGE *(Colorware)*
1,792,800 ★Chad Presley, Luseland, Saskatchewan
ROGUE *(Epyx)*
63,934 ★Marshall Weisenburger, Quincy, IL
43,222 Hans Lutenegger, Madison, IA
27,542 Melanie Lapoint, Fitchburg, MA
21,682 Paul Blessing, Spring, TX
17,851 Yvan Langlois, Laval, Quebec
15,445 Frankie DiGiovanni, Olney, MD
SANDS OF EGYPT *(Radio Shack)*
67 ★Tristan Terkuc, Richmond, Ontario
82 Edward Rocha, Cobleskill, NY
85 Paul Summers, Orange Park, FL
86 Roy Grant, Toledo, OH
87 Neil Haupt, Elyria, OH
SAUCER DEFENSE *(THE RAINBOW, 4/87)*
40,000 ★David Hartmann, Osoyoos, British Columbia
4,000 Frankie DiGiovanni, Olney, MD
SHAMUS *(Radio Shack)*
25,450 ★John Garness, Newell, SD
SHOOTING GALLERY *(Radio Shack)*
27,270 ★Jocelyn Hellyer, Montgomery, IL
25,510 Donald Knudson, Minot, ND
20,480 Kevin Pereira, Corsicana, TX
SHOOT'N RANGE (THE RAINBOW, 8/87)
55,623 ★Paul Robbins, Picayune, MS
14,702 Richard Winkelbauer, Bronx, NY
13,794 Phillip Holsten, Modesto, CA
5,433 Benoit Landry, Drummondville, Quebec
SLAY THE NERIUS *(Radio Shack)*
73,091 ★Jeff Remick, Warren, MI
SPACE ASSAULT *(Radio Shack)*
13,110 ★Jeff Remick, Warren, MI
7,280 Jason Kopp, Downs, IL
6,200 John Weaver, Amsterdam, NY
SPEEDSTER (THE RAINBOW 8/87)
103,140 ★Richard Winkelbauer, Bronx, NY
88,090 Jason Landreth, Texico, IL
44,540 Kevin Pereira, Corsicana, TX
37,970 Frederick Lajoie, Nova Scotia, Canada
35,040 John Valentine, Marlborough, CT
32,110 Lisa Williamson, Watauga, TX
SPIDERCIDE *(Radio Shack)*
27,730 ★Mike LeBrun, Cornwall, Ontario
1,840 Dave Staub, Moundsville, WV
SPRINGSTER *(Radio Shack)*
303,520 ★Mavis Hartmann, Osoyoos, British Columbia
SUPER ROOTER (THE RAINBOW, 5/86)
19,090 ★Frederick Lajoie, Nova Scotia, Canada
15,180 Richard Donnell, Penns Grove, NJ
3,910 Daniel Bradford, Birmingham, AL
TEMPLE OF ROM *(Radio Shack)*
604,000 ★Troy Graham, Arnold, MD
507,700 Adam Broughton, Morris, PA
303,600 Tim Hennon, Highland, IN
138,400 Gary Budzak, Westerville, OH
125,200 Michelle Murray, Salem, IN

THEXDER *(Sierra On-Line)*
1,411,700 ★Steve Hallin, Biloxi, MS
1,314,100 Frankie DiGiovanni, Olney, MD
312,300 Timothy DeJong, Rock Valley, IA
195,000 Emmett Keyser, Napa, CA
TREASURE QUEST (THE RAINBOW, 11/86)
66,760 ★Clara Smith, Courtenay, British Columbia
29,340 Matthew Smith, Courtenay, British Columbia
TREKBOER *(Mark Data)*
123 ★Roy Grant, Toledo, OH
132 Matthew Fumich, Munford, TN
TRIG ATTACK *(Sugar Software)*
196,000 ★Cassaundra Stewart, Sacramento, CA
TUT'S TOMB *(Mark Data)*
118,720 ★Reina Roy, Carleton, Quebec
74,780 Mack Haynes, Nice, CA
72,000 Chad Presley, Luseland, Saskatchewan
60,020 Don Siler, Muncie, IN
45,000 Blake Cadmus, Reading, PA
VARLOC *(Radio Shack)*
2,032 ★Tony Harbin, Cullman, AL
2,032 ★Edward Rocha, Cobleskill, NY
2,011 Antonio Souza III, North Dartmouth, MA
2,008 Philip Puffinburger, Winchester, VA
1,995 Denise Rowan, Minneapolis, MN
1,991 Ryan Grady, Newbury Park, CA
1,988 Randall Edwards, Dunlap, KS
VICIOUS VIC (THE RAINBOW, 7/86)
18,813 ★Talib Khan, Bronx, NY
11,902 Martha James, Swarthmore, PA
10,489 Karl Gulliford, Summerville, SC
6,294 Pat O'Neill, Nepean, Ontario
4,643 Martha James, Swarthmore, PA
THE VORTEX FACTOR *(Mark Data)*
100/276 ★Tommy Crouser, Dunbar, WV
100/483 Rick & Brenda Stump, Laureldale, PA
210 Paul Maxwell, Vancouver, British Columbia
WARP FACTOR X *(Prickly-Pear)*
10,577,051 ★Doug Lute, Clymer, PA
WILDWEST *(Tom Mix)*
35 ★Paul Summers, Orange Park, FL
WISHBRINGER *(Infocom)*
400/201 ★Brad Wilson, Lithia Springs, GA
WIZARD'S DEN *(Tom Mix)*
195,050 ★Mark Touchette, Preston, CT
WRESTLE MANIAC *(Diecom)*
956,971 ★Marc Reiter, Cincinnati, OH
546,315 Louis Bouchard, Gatineau, Quebec
45,483 Tony Bacon, Mt. Vernon, IN
42,105 David Brown, New Waterford, Nova Scotia
39,086 Billy Helmick, Independence, KY
ZAKSUND *(Elite Software)*
357,550 ★Martin Parada, Arcadia, CA
268,350 Tony Bacon, Mt. Vernon, IN
44,900 Michael Adams, Columbia, SC
39,950 Walter Hearne, Pensacola, FL
ZAXXON *(Datasoft)*
2,061,000 ★Byron Alford, Raytown, MO
1,950,000 Blake Cadmus, Reading, PA
1,300,500 Dan Brown, Pittsford, NY
1,100,600 Andrew Urquhart, Metairie, LA
376,600 Matthew Yarrows, Easthampton, MA
57,895 Vincent Tremblay, Matane, Quebec
ZEUS *(Aardvark)*
4,500 ★Benoit St-Jean, Gatineau, Quebec
3,380 Martin Kertz, Forrest City, AR
ZORK I *(Infocom)*
350/328 ★Konnie Grant, Toledo, OH
350/587 Matthew Yarrows, Easthampton, MA
ZONX (THE RAINBOW, 10/85)
12,000 ★Adam Broughton, Morris, PA

— Jody Doyle

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

- Duncan Cameron: To get to the blue doors in *Bedlam*, you must be in your cell. From there, type `OPEN GREEN DOOR`. Then go south, east, open the green door, go north and get Napoleon to follow you. Go south, ask Napoleon to open the red door and go south again. You will find the blue doors as you go through the north-south hallway.

  To get the red key, go to the cabinet where the red key is located and type `GO WEST`. Take the window hook and go east. Take the red key with the window hook. You do not necessarily need the red key, just get Napoleon to follow you. When you need a door opened, whether it is green, red or blue, just type `NAPOLEON OPEN RED DOOR` (or whatever color door you need opened).

Jon Hobson
Plainfield, WI

- James Green: It is impossible to retrieve the wizard's image scroll in *Dungeons of Daggorath*. The third ring is in the level after you kill the wizard's image; it comes from a goldrog and is the joule ring. Incant it to the energy ring; you need this to help kill the evil wizard. The elvish sword also comes from a goldrog; you need this for the wizard as well.

- Robert Sherman: In order to get the flashlight in the Chugalug trading post in *Dallas Quest*, you must pull the curtain, then give the monkey the tobacco. Drop everything except the flashlight, and type `CLIMB LADDER`. Before going down into the pit, turn the light on. In the pit go east, enter the post, get the sack, put everything in it and climb down. Get the light and go west.

Andy Yarrows
Easthampton, MA

- Jason Ebbeling: To row the boat in *Dallas Quest*, you have to type `ROW BOAT`; you must have the small shovel.

  After giving the eggs to the natives and giving the mirror to the monkey, what do you do? How do you get to the cave?

Sagie Kraidman
Brooklyn, NY

Scoreboard:

I am stuck on Level 9 in *Bouncing Boulders* and can only get about five out of 25 gems. Can anyone give me some advice to get all of them so I can get to Level 10?

Troy Grice
Sinton, TX

Scoreboard:

I have gotten as far as the iron castle in *Caladuril Flame of Light*, but I can't get across the blue and red game board. I have the map the parrot gave me, but when I step on the last square of the "safe route" I get zapped.

In *In Search of the Star Lord*, I can't find the control circuit for the laser barricades.

Floyd Resler
Cincinnati, OH

Scoreboard:

When I get to the island in *Calixto Island*, I cannot get past the natives.

Clifford Lingle
Overland Park, KS

Scoreboard:

What do you do with the eggs in *Dallas Quest* once you're in the cave?

Danielle Ramsey
Centralia, MO

Scoreboard:

In *Dallas Quest* I cannot get out of the tree after I jump out of the plane.

I die before I can get to the pool in *Sands of Egypt*. Please help.

Andrea Jenkins
Gander, Newfoundland

Scoreboard:

In *Finding Enrakian Treasure* I need to know what to do in the colored rooms. Where is the bullet? How do I get the rose?

How do I get past the rats and through the locked door by the diner in *Sam Diamond P.I.*?

In *SYZYGY* what do I do with the sword, knife, string, blanket and spacesuit? How do I work the transporter console? Where do I find this fuzzy creature I've heard about? What use is the elevator?

Angela Aldred
East Peoria, IL

Scoreboard:

How can I open the lock mechanism in *Graphic Pyramid*? How can I go back to the archeologist hut with the treasures?

J.P. Brassard
Jonquiere, Quebec

Scoreboard:

In *Lansford Mansion* how do you prevent the guard from throwing you out several moves after you yell fire?

How do you prevent from getting killed by sand when you dig in *Infidel*?

Ed Gilliland
Southfiled, MI

Scoreboard:

I need help getting past the cliff and other places in *Martian Crypt*. Any hints, tips and vocabulary would be appreciated.

Jon Miller
St-Lambert, Quebec

Scoreboard:

How do I get to the central computer in *Thexder* after I have completed the 15 levels?

Glenn Laws
Toledo, OH

Scoreboard:

After I deliver the letter to the magic shop in *Wishbringer*, I come down the mountain, but I cannot get past the troll at the covered bridge. He wants a gold coin, but I don't have any. How do I get past him?

In *Dallas Quest* when you leave the trading post, how do you get to the cannibals?

H. James Herchek
Cleveland Heights, OH

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

Keep track of the body count in role-playing games

The "Hit" List

By Andrew Dater

Since 1981, a new role-playing game has swept across the nation. The game is Killer. Unlike those in other role-playing games, the players are the *actual* characters; they go around shooting other players with squirt or dart guns, blowing them up with water balloon hand grenades, and blasting them with flashlight lasers.

Most games involve some sort of scenario. For instance, in the Circle of Death you are given a victim to "kill." If you "off" your victim, you go after your victim's victim, and so on. But watch out, the same thing is happening behind you, and if you're not careful, it could happen to you!

Or you may be playing the Mafia scenario. This one pits rival gangs against each other, with one team designated as the FBI. Not only do you try to "kill" your opponents, but you try to amass enormous wealth. But be careful because, just as in real life, the gangs have spies, and you may not live to see tomorrow if you're found out!

The person who organizes the game must keep track of large amounts of data. This includes who was killed, how many points earned, personal information, and so on. What could be better for keeping track of all this information than good ol' CoCo?

The Assassination Game Utility is very easy to use. It runs from a main menu of 10 choices. All you have to do is press 0 through 9 and you are taken to the appropriate subroutine.

Andy Dater works for Tandy as a training and support specialist in the Business Products division. He is involved in many role-playing games, and playing Killer *was a natural progression into real-life role-playing. Andy's username on Delphi is* DATER.

Throughout the program, if you want to return to the menu, press Q. On options 2, 3 and 4, when it asks for the player's name, press ENTER. It will ask you for a code name if you can remember it more easily.

Options 1 through 3 let you add, edit or remove players. When players are created, they are automatically made alive and active. Both of these may be changed using Option 4. The program allows for only 40 players, so if you near the limit, you may delete players or change the `DIM` statement if memory allows.

Option 4 allows you to change the amount of kill, bonus and penalty points a player has and change the alive and active statuses. If a player is in the round you are currently running, he must be active and either alive or dead. If a player you have on your list is not playing the current round, he must be made inactive. After you make the necessary changes, press Q to return to the menu and press the space bar to change another player.

Options 5 and 6 take care of points for staying alive each day and points for not making a kill after a certain number of days. Option 7 separates the players by their being either "alive" or "dead," sorting them by points from highest to lowest, and then prints out the list to the printer.

Option 8 sorts the players alphabetically and then returns to the menu (this is so the players will be in alphabetical order when you do a list). Option 9 lists the players and their code names to the screen. If you print the list to the printer, the alive and active statuses will also be printed.

Before you run the program for the first time or after you have killed the data file, you must run the following listing, which creates a "dummy" data file:

```
10 OPEN"O",1,"TAG"
20 PRINT#1,0
30 CLOSE
```

If you find that the data categories don't suit your needs, you can change the category titles in Line 3040. You should not, however, change first name, last name or code name.

I have used the speed-up poke in the two sort routines, so for those of you whose computers can't handle it, delete lines 960 and 2130.

This program helps me a lot when I run rounds of The Assassination Game and have to keep track of points. I hope it will help you if you plan on running a round.

If you want more information about the game, go to your local hobby or game store and look for the book called *Killer*, by Steve Jackson. It is a manual on the game and it explains it very well.

(Questions about this program may be addressed to the author at 23751 Albers, Woodland Hills, CA 91367. Please enclose an SASE for a written reply.) ☐

250	52	1730	251
440	255	1970	124
650	78	2160	200
840	188	2450	39
1100	40	2600	196
1300	161	2880	255
1520	159	END	166

The listing: KILLER

```
10 'THE ASSASSINATION GAME
20 '(C) 1986 ANDY DATER
30 GOTO3050
40 FILES1:CLEAR12000:DIMD$(40,18
),T$(40,17),SM$(17),P(4)
50 CLS:PRINT"LOADING DATA..."
60 OPEN"I",1,"TAG/DAT"
70 INPUT#1,R
80 IFR=0THEN130
90 FORX=1TOR
100 FORY=1TO17
110 LINEINPUT#1,D$(X,Y)
120 NEXTY,X
130 CLOSE
140 FORX=1TO11
150 READD$(0,X)
160 NEXTX
170 CLS:P$="THE ASSASSINATION GA
ME":GOSUB2800
180 PRINT
190 PRINTTAB(5)"1 - ADD PLAYER"
200 PRINTTAB(5)"2 - EDIT PLAYER"
210 PRINTTAB(5)"3 - DELETE PLAYE
R"
220 PRINTTAB(5)"4 - CHANGE POINT
S"
230 PRINTTAB(5)"5 - DAILY BONUSE
S"
240 PRINTTAB(5)"6 - NON-KILL PEN
ALTIES"
250 PRINTTAB(5)"7 - PRINT POINTS
 LIST"
260 PRINTTAB(5)"8 - SORT LIST"
270 PRINTTAB(5)"9 - LIST PLAYERS
"
280 PRINTTAB(5)"0 - QUIT"
290 Q$=INKEY$:IFQ$<"0"ORQ$>"9"TH
EN290
300 A$="":B$="":N=0
310 ONVAL(Q$)+1GOSUB2690,340,500
,720,1140,1630,1890,2110,950,255
0
320 I$="":GOTO170
330 'ADD PLAYER
340 CLS:P$="ADD PLAYER":GOSUB280
0
350 GOSUB2850
360 R=R+1
370 FORX=1TO11
380 L=76+32*X
390 GOSUB2970
400 IF(I$="Q"ORI$="")ANDX=1THENR
=R-1:RETURN
410 D$(R,X)=I$
420 NEXTX
430 FORX=12TO15:D$(R,X)=STR$(0):
NEXTX:D$(R,16)="ALIVE":D$(R,17)=
"Y"
440 PRINT@480,"ARE ENTRIES CORRE
CT? (Y/N/Q)";
450 A$=INKEY$:IFA$="N"THENN=R:GO
TO630ELSEIFA$="Q"THENRETURNELSEI
FA$<>"Y"THEN450
460 PRINT@480,"ADD ANOTHER? (Y/N
)          ";
470 A$=INKEY$:IFA$="Y"THENPRINT@
480,STRING$(31," ");:GOTO350ELSE
IFA$<>"N"THEN470
480 RETURN
490 'EDIT PLAYER
500 CLS:P$="EDIT PLAYER":GOSUB28
00
510 PRINT@96,"";:LINEINPUT"NAME:
 ";A$
520 IFA$="Q"THENRETURN
530 IFA$<>""THEN560
540 LINEINPUT"CODENAME: ";A$
550 IFA$=""THENRETURNELSE590
560 Q=INSTR(A$," ")
570 IFQ=0THENA$="":GOTO500
580 B$=RIGHT$(A$,LEN(A$)-Q):A$=L
EFT$(A$,Q-1)
590 FORN=1TOR
600 IFA$=D$(N,1)ANDB$=D$(N,2)THE
N630ELSEIFA$=D$(N,3)THEN630ELSEN
EXTN
610 PRINT"NOT FOUND."
```

```
620 EXEC44539:GOTO500
630 AN=1:AD=1:GOSUB2850
640 A$="":PRINT@448,STRING$(31,"
 ");:PRINT@448,"";:LINEINPUT"CHA
NGE WHICH FIELD: ";A$
650 IFA$="Q"THENRETURNELSEA=VAL(
A$)
660 IFA<1ORA>11ORA<>INT(A)THEN64
0
670 L=112+32*(A-1)
680 GOSUB2970
690 IFI$=""THENPRINT@L,D$(N,A);E
LSED$(N,A)=I$
700 GOTO640
710 'DELETE PLAYER
720 CLS:P$="DELETE PLAYER":GOSUB
2800
730 PRINT@96,"";:LINEINPUT"NAME:
 ";A$
740 IFA$="Q"THENRETURN
750 IFA$<>""THEN780
760 LINEINPUT"CODENAME: ";A$
770 IFA$=""THENRETURNELSE810
780 Q=INSTR(A$," ")
790 IFQ=0THENA$="":GOTO720
800 B$=RIGHT$(A$,LEN(A$)-Q):A$=L
EFT$(A$,Q-1)
810 FORN=1TOR
820 IFA$=D$(N,1)ANDB$=D$(N,2)ORA
$=D$(N,3)THEN850ELSENEXTN
830 PRINT"NOT FOUND."
840 EXEC44539:GOTO720
850 AD=1:GOSUB2850
860 PRINT@480,"ARE YOU SURE? (Y/
N)";
870 A$=INKEY$:IFA$="N"THENRETURN
ELSEIFA$<>"Y"THEN870
880 FORX=N+1TOR
```

One-Liner Contest Winner . . .

If you want to traumatize the authority figure in your life, run this program and take potshots at the TV. This one-liner generates a changing pattern of bull's-eyes. If you can find your old rubber-tipped dart guns, you're set for target practice.

The listing:

```
1 PMODE4,1:SCREEN1,1:PCLS:POKE17
8,3:CIRCLE(126,96),20:CIRCLE(126
,96),40:CIRCLE(126,96),60:CIRCLE
(126,96),80:CIRCLE(126,96),92:PA
INT(126,96),,1:POKE178,1:PAINT(4
4,96),,1:POKE178,2:PAINT(48,96),
,1:POKE178,31:PAINT(72,96),,1:FO
RW=1TO5000:NEXTW:GOTO1
```

Merwyn Bly
Vienna, VA

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

```
890 FORY=1TO17
900 D$(X-1,Y)=D$(X,Y)
910 NEXTY,X
920 R=R-1
930 RETURN
940 'SORT LIST
950 CLS:PRINT"SORTING..."
960 POKE65495,0
970 FORP=1TOR
980 PRINT@32,P;
990 SM$(1)=CHR$(255):SM$(2)=CHR$
(255)
1000 FORA=1TOR
1010 PRINT@40,A;
1020 IFD$(A,2)+D$(A,1)<SM$(2)+SM
$(1)THENFORX=1TO17:SM$(X)=D$(A,X
):NEXTX:SB=A
1030 NEXTA
1040 FORX=1TO17:T$(P,X)=SM$(X):N
EXTX
1050 D$(SB,1)=CHR$(255):D$(SB,2)
=CHR$(255)
1060 NEXTP
1070 FORX=1TOR
1080 FORY=1TO17
1090 D$(X,Y)=T$(X,Y)
1100 NEXTY,X
1110 POKE65494,0
1120 RETURN
1130 'CHANGE POINTS
1140 CLS:P$="CHANGE POINTS":GOSU
B2800
1150 PRINT@96,"";:LINEINPUT"NAME
: ";A$
1160 IFA$="Q"THENRETURN
1170 IFA$<>""THEN1200
1180 LINEINPUT"CODENAME: ";A$
1190 IFA$=""THENRETURNELSE1230
1200 Q=INSTR(A$," ")
1210 IFQ=0THENA$="":GOTO1140
1220 B$=RIGHT$(A$,LEN(A$)-Q):A$=
LEFT$(A$,Q-1)
1230 FORN=1TOR
1240 IFA$=D$(N,1)ANDB$=D$(N,2)TH
EN1270ELSEIFA$=D$(N,3)THEN1270EL
SENEXTN
1250 PRINT"NOT FOUND."
1260 EXEC44539:GOTO1140
1270 PRINT@96,"NAME: "D$(N,1)" "
D$(N,2)
1280 PRINT"CODENAME: "D$(N,3)
1290 PRINT
1300 FORX=1TO4:P(X)=VAL(D$(N,X+1
1)):NEXTX
1310 P(4)=P(1)+P(2)+P(3)
1320 PRINT@192,"1 - KILLS:     "P
(1)
1330 PRINT"2 - BONUSES:   "P(2)
1340 PRINT"3 - PENALTIES:"P(3)
1350 PRINT"4 - TOTAL:     "P(4)
1360 PRINT"5 - STATUS:    "D$(N,
16)
1370 PRINT"6 - ACTIVE:      "D$(N,
17)
1380 PRINT@384,"CHANGE WHICH? (1
-6)           "
1390 A$=INKEY$:IF(A$<"1"ORA$>"6"
)ANDA$<>"Q"ANDA$<>" "THEN1390ELS
EA=VAL(A$)
1400 IFA$="Q"ORA$=" "THEN1570
1410 PRINT@384,STRING$(31," ");:
PRINT@384,"";
1420 IFA=5THEN1470
1430 IFA=6THEN1530
1440 C=0:INPUT"CHANGE";C
1450 P(A)=P(A)+C
1460 GOTO1310
1470 PRINT"IS PLAYER <A>LIVE OR
<D>EAD"
1480 I$=INKEY$:IFI$=""THEN1480
1490 IFI$="A"THEND$(N,16)="ALIVE
":GOTO1320
1500 IFI$="D"THEND$(N,16)="DEAD"
:GOTO1320
1510 IFI$=CHR$(13)THENGOTO1320
1520 GOTO1480
1530 PRINT"IS PLAYER ACTIVE? (Y/
N)"
1540 I$=INKEY$:IFI$<>"Y"ANDI$<>"
N"THEN1540
1550 D$(N,17)=I$
1560 GOTO1320
1570 FORX=1TO4
1580 D$(N,X+11)=STR$(P(X))
1590 NEXTX
1600 IFA$=" "THEN1140
1610 RETURN
1620 'DAILY BONUSES
1630 CLS:P$="ADD DAILY POINTS":G
OSUB2800
1640 PRINT
1650 INPUT"HOW MUCH TO ADD TO EA
CH ALIVE    PLAYER";A
1660 IFA=0THENRETURNELSECLS
1670 FORX=1TOR
1680 IFD$(X,16)="DEAD"ORD$(X,17)
="N"THEN1720
1690 Q=Q+1
1700 PRINTD$(X,1)" "D$(X,2):PRIN
TTAB(10)D$(X,3)
1710 IFQ/7=INT(Q/7)THENPRINT@489
,"PRESS <ENTER>";:EXEC44539:CLS
1720 NEXTX
1730 PRINT:PRINT"IS LIST CORRECT
? (Y/N)"
1740 I$=INKEY$:IFI$=""THEN1740
1750 IFI$="Y"THEN1780
1760 IFI$="N"THENPRINT"PRESS <EN
TER> TO RETURN":EXEC44539:RETURN
1770 GOTO1740
1780 FORX=1TOR
1790 IFD$(X,16)="DEAD"THEN1830
1800 D$(X,13)=STR$(VAL(D$(X,13))
+A)
1810 D$(X,15)=STR$(VAL(D$(X,15))
+A)
1820 N=N+1
1830 NEXTX
1840 PRINTN"PLAYERS CHANGED"
1850 X$=INKEY$
1860 IFINKEY$=""THEN1860
1870 RETURN
1880 'NON-KILL PENALTIES
1890 CLS:P$="NON-KILL PENALTIES"
:GOSUB2800
1900 PRINT
1910 PRINT@96,;:INPUT"HOW MUCH T
O SUBTRACT FROM EACH  ALIVE PLAY
ER";S
1920 IFS=0THENRETURN
1930 IFS<>ABS(INT(S))THEN1890
1940 FORX=1TOR
1950 IFD$(X,16)<>"ALIVE"ORD$(X,1
7)="N"THEN2060
1960 PRINT@192,"NAME: "D$(X,1)"
"D$(X,2)+STRING$(12-LEN(D$(X,2))
,32)
1970 PRINT"CODENAME: "D$(X,3)"
        "
1980 PRINT@288,"KILL POINTS:"D$(
X,12)"    "
1990 PRINT"SUBTRACT"S"POINTS? (Y
/N/Q)"
2000 A$=INKEY$:IFA$=""THEN2000
2010 IFA$="Q"THENRETURN
2020 IFA$="N"THEN2060
2030 IFA$<>"Y"THEN2000
2040 D$(X,14)=STR$(VAL(D$(X,14))
-S)
2050 D$(X,15)=STR$(VAL(D$(X,15))
-S)
2060 NEXTX
2070 PRINT
2080 PRINT"DONE."
2090 EXEC44539:RETURN
2100 'PRINT POINTS LIST
2110 CLS:P$="PRINT POINTS":GOSUB
2800
2120 PRINT:PRINT"SORTING..."
2130 POKE65495,0
2140 TV=0:TR=0:A=0:NA=0:NU=0
2150 FORX=1TOR
2160 IFLEFT$(D$(X,16),1)="A"ANDD
$(X,17)="Y"THENNA=NA+1
2170 NEXTX
2180 FORX=1TOR
2190 IFD$(X,17)="N"THEND$(X,18)=
"U":NU=NU+1
2200 NEXTX
2210 FORX=1TOR
2220 PRINT@0,X;
2230 FORY=1TOR
2240 IFVAL(D$(Y,15))=>TV ANDD$(Y
,18)<>"U"THENTV=VAL(D$(Y,15)):TR
=Y
2250 NEXTY
2260 IFLEFT$(D$(TR,16),1)="D"THE
N2330
2270 A=A+1
2280 FORZ=13TO16
2290 T$(A,Z)=D$(TR,Z)
2300 T$(A,3)=D$(TR,3)
2310 NEXTZ
2320 GOTO2380
2330 NA=NA+1
2340 FORZ=13TO16
2350 T$(NA,Z)=D$(TR,Z)
2360 T$(NA,3)=D$(TR,3)
2370 NEXTZ
2380 D$(TR,18)="U":TV=0
2390 NEXTX
2400 FORX=1TOR
2410 D$(X,18)=""
2420 NEXTX
2430 POKE65494,0
2440 PRINT@128,"PRINTING..."
2450 FORX=1TO6:PRINT#-2,"":NEXTX
2460 PRINT#-2,TAB(11)"CODENAME"T
AB(24)"KILLS"TAB(34)"BONUSES"TAB
(46)"PENALTIES"TAB(60)"TOTAL"TAB
(70)"STATUS"
2470 PRINT#-2,TAB(11)"--------"T
AB(24)"-----"TAB(34)"-------"TAB
(46)"---------"TAB(60)"-----"TAB
(70)"------"
2480 PRINT#-2,""
2490 FORX=1TO(R-NU)
2500 PRINT#-2,TAB(4)T$(X,3)TAB(2
5)T$(X,12)TAB(36)T$(X,13)TAB(49)
T$(X,14)TAB(61)T$(X,15)TAB(71)T$
(X,16)
2510 NEXTX
2520 PRINT#-2,CHR$(12);
2530 RETURN
2540 'LIST PLAYERS
2550 CLS:P$="LIST PLAYERS":GOSUB
2800
2560 PRINT
2570 PRINT"PRINT LIST TO PRINTER
? (Y/N/Q)"
2580 A$=INKEY$:IFA$<>"Y"ANDA$<>"
N"ANDA$<>"Q"THEN2580
2590 IFA$="Q"THENRETURN
2600 IFA$="Y"THENP=1ELSEP=0
2610 CLS:FORX=1TOR
2620 PRINTD$(X,1)" "D$(X,2):PRIN
TTAB(10)D$(X,3)
2630 IFP THENPRINT#-2,D$(X,1)" "
D$(X,2)TAB(28)D$(X,3)TAB(45)D$(X
,16)
2640 IFX/7=INT(X/7)THENPRINT@489
,"PRESS <ENTER>";:FORQ=0TO1STEP0
:Q$=INKEY$:IFQ$="Q"THENRETURNELS
EIFQ$=""THENNEXTQ ELSECLS
```

```
2650 NEXTX
2660 PRINT:PRINTR"PLAYERS"
2670 EXEC44539:RETURN
2680 'QUIT
2690 CLS:PRINT"SAVE DATA? (Y/N)"
2700 A$=INKEY$:IFA$="N"THENENDEL
SEIFA$<>"Y"THEN2700
2710 CLS:PRINT"SAVING DATA..."
2720 OPEN"O",1,"TAG/DAT"
2730 PRINT#1,R
2740 FORX=1TOR
2750 FORY=1TO17
2760 PRINT#1,D$(X,Y)
2770 NEXTY,X
2780 END
2790 'CENTER ROUTINE
2800 T=16-LEN(P$)/2
2810 PRINTTAB(T)P$
2820 PRINTTAB(T)STRING$(LEN(P$),
"-")
2830 RETURN
2840 'PRINT TITLES ROUTINE
2850 FORX=1TO11
2860 AN$=RIGHT$(STR$(X),1)+" - "
2870 IFX=10THENAN$="10- "
2880 IFX=11THENAN$="11- "
2890 PRINT@64+X*32,"";
2900 IFAN THENPRINTAN$;
2910 PRINTD$(0,X);
2920 IFAD THENPRINTD$(N,X)ELSEPR
INT
2930 NEXTX
2940 AN=0:AD=0
2950 RETURN
2960 'INPUT DATA ROUTINE
2970 I$="":PRINT@L,STRING$(15,32
)
2980 PRINT@L+LEN(I$),CHR$(191)
2990 A$=INKEY$:IFA$=""THEN2990
3000 IFA$=CHR$(8)ANDLEN(I$) THEN
I$=LEFT$(I$,LEN(I$)-1):PRINTA$;:
GOTO2980
3010 IFA$=CHR$(21)THEN2970
3020 IFA$=CHR$(13)THENPRINT@L+LE
N(I$)," ";:RETURN
3030 IFASC(A$)<32ORASC(A$)>122TH
EN2990ELSEI$=I$+A$:PRINT@L+LEN(I
$)-1,A$;:GOTO2980
3040 DATA"FIRST NAME: ","LAST NA
ME:  ","CODENAME:   ","TELEPHONE
: ","HEIGHT:     ","WEIGHT:     
","HAIR COLOR: ","EYE COLOR:  "
,"CAR DRIVEN: ","ACTIVITIES: ","
GRADE:      "
3050 PCLEAR1:GOTO40
```

Basic vocabulary for elementary students

Matching Opposites

By Fred B. Scerbo
Rainbow Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Inspiration can come from the strangest sources. That's the whole premise on which this column is based. You, the reader, suggest ideas that I can translate into concrete BASIC programs for your Color Computer.

It has been a long time since I have gotten really excited about a project. Don't misunderstand me: I don't mean that recent "Wishing Well" programs have not been up to snuff. It is just that some suggestions can really light a fire in my head. Every now and then it is nice to be so excited about a program idea that I spend every spare minute creating at the CoCo keyboard, even late into the night.

This month's program is the result of just such an inspiration. *Opposites Vol. I* is a rather long listing designed for the younger, elementary school-aged CoCo user. It is also the basis for a new "Wishing Well" game that will appear in next month's RAINBOW as well as a few new programming techniques I will introduce to you.

The Motivation

Several months ago I put out a request for old gray CoCos that were gathering dust in people's closets. Since that time, over a dozen kind souls have donated CoCos, disks or disk drives to our special needs program here at Drury High School. As a result, our resource room is now using the Color Computers every single period of the day with either word processing or skills reviews. We are never without a free machine for a student who needs to use one. That is great!

That was not the end of my effort, however. In recent weeks I have been able to patch together three more complete systems, using cassettes and some old black-and-white TV sets. (We can always still find good homes for other retired CoCos!) With the three systems in hand, I went to our city's oldest elementary school, originally built around the turn of the century. It is one of our few truly "neighborhood" schools left; in fact, I was there as a student back in the late '50s.

We have three special needs classes at that school, dealing with students who have simple learning disabilities to those with severe emotional and physical handicaps. Among the three classes there was only one computer, an old Atari 800 with only about a dozen or so working programs. In other words, these three classes had no real computer contact at all.

This school was the perfect location for three of these donated CoCos. Without going into great detail, I can now say that just a few weeks later, the Color Computers have become an integral part of each classroom, in use almost every period of the day. All the software used is coming directly from the pages of THE RAINBOW, either from past "Wishing Well" programs or other authors' submissions.

The Inspiration

Naturally, these three teachers are just thrilled to have this added resource in their classes. However, I have not written much software for very young students, especially those with special needs; I normally work with high school students. I was wide open for any suggestions for programs.

After about a week one of the teachers commented, "These programs are just great, but do you have anything on opposites?"

Opposites! That may seem like too simple a category to cover in a computer program, but keep in mind that special needs students have a real conceptual blockage at times. They may know that hot and cold are similar, but they do not really understand what opposite means. This seemed like a good challenge. Besides, mainstream youngsters could use it, too.

The closest I had come to a program on opposites was my old *Homonyms* program, which could be used with antonyms, as well. However, what the teacher seemed to need was something quite different. Some of her students were only 5 or 6 years old. A text program didn't seem to fit the bill.

She needed something that would really emphasize the opposite nature of two terms, such as over and under, up and down, or happy and sad. The only way to accomplish this in a way that would be useful to the really young required the use of graphics.

The Graphics

At last I had a valid excuse to get back into some exciting graphics creations. As you will recall, it has been some time since creations like *Rockfest* or *Football Fever* showed how to construct impressive CoCo graphics from BASIC. This would be a good opportunity to incorporate simple graphics with concepts. However, some concepts would be harder to represent than others, as I would soon find.

I felt the most effective graphics would be both easily recognizable and large. To accommodate the size, I chose to work in `PMODE0`.

`PMODE0`? Don't get excited. There are four very logical reasons for using our lowest-grade high resolution. First, the pixels for `PMODE0` are perfect squares only slightly larger than in `PMODE4`. Second, one screen in `PMODE0` occupies only one graphics page; in a regular power-up there are automatically four graphics pages to use, allowing the rapid use of `PCOPY` in creating screens.

Third, drawing large graphics in

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

PMODE0 will lend itself perfectly to reduction using the S (size) command in our DRAW statement. (Sometimes when you enlarge or reduce using S, you will get a distorted graphic, especially when using diagonals E, F, G and H. This eliminates the problem.)

Finally, using PMODE0 allows a sharp black-and-white image without color distortion found in the thin lines drawn in PMODE4. Since I want to easily convey a concept in a graphic, straight black and white is the best route to go. Besides, all three CoCo stations I set up were with black-and-white TV sets!

The Program

I do not want to go to great length in explaining the listing, since it is very long due to the amount of data used. Instead, let's simply take a quick look at what the program involves.

There are 40 graphics strings for drawing concepts and text. This makes 20 sets of two opposite matches: up and down, left and right, etc. I chose not to create a graphics set of alphanumeric characters this time, so each string is self-contained with all the information it needs to draw a complete graphic. This may seem the long way of doing things, but it speeds up execution of the drawing.

In a review section the user can run through each of the 20 sets on the screen alone. There is also a quiz that will highlight a graphic and ask the user to choose the correct opposite match by moving the flashing cursor with the space bar. All the choices are presented randomly, so the program is fairly unlimited in its variety.

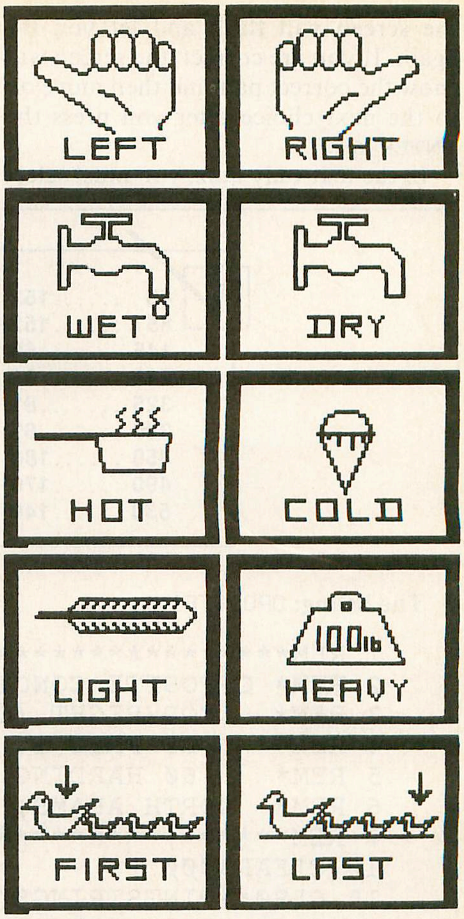
A third option is a quiz involving the words only. This allows a good test of whether the concepts have been related to the correct terms.

Using the Program

After the titlecard comes a menu of three choices. The first choice allows review of terms and graphics. Use the ENTER key to advance to each of the next graphics. At the end of the review, the program will rerun itself.

Both quiz sections allow you to check your score by pressing the @ key. You may continue with either quiz by pressing C to continue.

In the graphics quiz, pressing the space bar moves the cursor around the screen. Press ENTER when you are on the correct match. If you are incorrect,



COCO
ACCESSORIES

Hardware

2 Drive System(2 DSDD Drives in one case)* ——— $329.95 ———

Drive 1 Upgrade(1 DSDD for your 26-3129 or 3131) Specify Catalog# when ordering !! ——— $119.95 ———

Drive 0-SSDD Full Height* ——— $209.95
Drive 1-SSDD Full Height ——— $135.95
COCO 3 512K Upgrade ——— $219.95
COCO 3 Keyboard ——— $34.95

Epson LX-800 Printer $219.95
180 CPS - DRAFT
30 CPS - NLQ
3K BUFFER
REQUIRES SERIAL TO PARALLEL INTERFACE

Software & Misc.

Art Deli(440 Pix on 10 disks) ——— $99.95
COCO Graphics Designer ——— $29.95
ADOS - $29.95 ADOS 3 - $39.95
Serial to Parallel Converters ——— $54.95
FKEYS III - $19.95 Sixdrive - $19.95
Telewriter 64 - $59.95 COCO-Util - $39.95
Gauntlet - $28.95 Pyramix - $24.95
Disto Super Controller ——— $99.95
COCO in Stitch (X-Stitch Patterns)- $'3.95

*Specify R.S. or Disto Controller.

The Computer Center

5512 Poplar Ave. Memphis, TN 38119 901-761-4565

IF YOU DON'T SEE IT, ASK US !

ALL DISK DRIVES CARRY A 90 DAY WARRANTY.

Add $4.90 for Shipping & Handling. VISA, Master Card, & Money Orders Accepted.
Allow 3 Weeks for personal checks, NO CODS. Prices may change without notice.

the screen will flash and let you try again. If you are correct, the screen will show the correct pair and then move on to the next choice after you press the ENTER key.

In the text-only quiz, you must select the correct response — 1, 2 or 3. You will get only one try on each term. The screen will indicate if you are correct or incorrect.

As you can tell from the program's title, there will be an *Opposites Vol. 2* very soon. It will cover somewhat more difficult concepts than this first version. However, next month I'll have the game I have been promising you for months, and it will have a great deal to do with what we have covered this month. ☐

45	153	575	68
85	152	610	157
145	60	655	109
215	36	705	2
325	81	750	201
390	65	835	73
450	180	940	15
490	176	END	213
530	140		

The listing: OPOSITE1

```
1 REM****************************
2 REM* OPPOSITE CONCEPTS VOL.1 *
3 REM*    COPYRIGHT (C) 1988    *
4 REM*    BY FRED B. SCERBO     *
5 REM*    60 HARDING AVENUE     *
6 REM*  NORTH ADAMS, MA 01247   *
7 REM****************************
10 CLEAR3000
15 CLS0:PRINTSTRING$(32,188);STR
ING$(32,156);:FORI=1TO 256 :READ
 A:PRINTCHR$(A+128);:NEXT
20 PRINTSTRING$(32,195);STRING$(
32,179);
25 PRINT@422,"  BY FRED B.SCERBO
  ";:PRINT@454," COPYRIGHT (C) 1
988 ";
30 DATA126,124,124,125,117,124,1
24,122,126,124,125,117,124,124,1
25,117,124,124,124,116,126,117,1
24,126,125,117,124,124,117,124,1
24,124
35 DATA122,,,117,117,115,115,122
,123,115,119,117,,,117,117,115,1
15,115,,122,,,122,,117,115,114,1
17,115,115,115
40 DATA122,,,117,117,,,,122,,,11
7,,,117,,,,117,,122,,,122,,117,,
,,,,117
45 DATA124,124,124,124,116,,,32,
120,,,116,124,124,124,116,124,12
4,124,116,124,,116,124,,116,124,
124,116,124,124,124
50 DATA46,44,44,45,37,,,32,42,,,
37,44,44,45,36,44,44,45,36,46,,3
6,46,32,37,44,44,36,44,44,45
55 DATA42,,,37,37,35,35,34,43,35
,35,37,,,37,33,35,35,39,,42,,,42
,,37,35,34,33,35,35,39
60 DATA42,,,37,37,,,42,42,,37,37
,,,37,37,32,,,,42,33,32,42,33,37
,,,37,,,
65 DATA44,44,44,44,36,44,44,40,4
4,44,44,36,44,44,44,36,44,44,44,
36,44,36,44,44,44,36,44,44,36,44
,44,44
70 X$=INKEY$:IFX$<>CHR$(13)THEN7
0
75 DIM P$(20,2),A$(6),B$(20),C$(
20),A(20),N(20),B(4),C(4),D(4),E
(4),F(4),AO(20)
80 FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO20:READP$(I,1),B$(I)
,P$(I,2),C$(I):NEXT
85 COLOR1,0:P$(8,2)=P$(8,1):P$(8
,1)=P$(8,1)+"BU28BR4F6NU16NE6U2N
H4NE4BD36BL6NR10D4NR10D6BR18NU10
BR8U10R10D4L10R4F6BR6R10U6L10U4R
10BR6R6ND10R6"
90 P$(8,2)=P$(8,2)+"BU24BR74F6NU
16NE6U2NH4NE4BD42BL74NU10R8BR6U6
NR10U4R10D10BR6R10U6L10U4R10BR6R
6ND10R6"
95 CLS:PRINTSTRING$(32,"=");:PRI
NT@68,"OPPOSITE CONCEPTS VOL.1":
PRINT@134,"A) REVIEW ALL TERMS":
PRINT@198,"B) QUIZ GRAPHICS":PRI
NT@262,"C) QUIZ TERMS ONLY"
100 PRINT@324,"<<<SELECT YOUR CH
OICE>>>"
105 PRINT:PRINTSTRING$(32,"=");:
PRINT@420,"DEDICATED TO THE STUD
ENTS":PRINTTAB(8)"OF JOHNSON SCH
OOL"
110 X$=INKEY$:X=RND(-TIMER):IFX$
="A"THEN365ELSEIFX$="B"THEN115EL
SEIFX$="C"THEN795ELSE110
115 CLS0:PMODE0,1:PCLS1
120 LINE(0,0)-(254,170),PRESET,B
125 LINE(6,4)-(122,82),PRESET,BF
130 LINE(128,4)-(248,82),PRESET,
B
135 LINE(6,86)-(122,164),PRESET,
B
140 LINE(128,86)-(248,164),PRESE
T,B
145 DRAW"BM26,188C0NU10R10NU10BR
6R10U6L10U4R10BR6NR10D4NR10D6R10
BR12BU6NE4D2F4BR6R10U6L10U4R10BR
6ND10R10D4NL10BR6NR10D6U10R10D10
BR6NR10U10R10BR6NR10D4NR10D6R10B
R10U10NL4R10D4NL10D6NL14BR6U10R1
0D4NL10D6BR6U10R10D4L10R4F6BR6E4
U2H4"
150 DATA130,6,246,80,6,86,120,16
```

```
2,130,86,246,162
155 PAINT(2,2),0,0:PCOPY1TO3
160 PMODE0,4:PCLS1
165 LINE(0,0)-(254,170),PRESET,B
F
170 LINE(8,6)-(120,80),PSET,BF
175 PCOPY4TO2:PMODE0,1:SCREEN1,1
180 DATA"BM2,8C1","BM130,8C0","B
M2,90C0","BM130,90C0","BM2,48C0"
,"BM130,48C0"
185 FORI=1TO20
190 A(I)=RND(20):IFN(A(I))=1THEN
190
195 N(A(I))=1:NEXTI:FORY=1TO20:C
OLOR1,0
200 FORI=2TO4
205 B(I)=RND(3)+1:IFN(B(I))=0THE
N205
210 N(B(I))=0:NEXTI:FORI=1TO4:N(
I)=1:NEXT
215 B=RND(20):IFB=A((Y))THEN215
220 C=RND(20):IFC=B OR C=A((Y))T
HEN220
225 DRAW A$(1):DRAWP$(A(Y),1)
230 DRAW A$(B(2)):DRAWP$(B,2)
235 DRAW A$(B(3)):DRAWP$(C,2)
240 DRAW A$(B(4)):DRAWP$(A(Y),2)
245 COLOR1,0
250 Z=0
```

```
255 PMODE0,4
260 DRAW A$(1)+"C0":DRAWP$(A(Y),
1)
265 DRAW A$(B(2))+"C1":DRAWP$(B,
2)
270 DRAW A$(B(3))+"C1":DRAWP$(C,
2)
275 DRAW A$(B(4))+"C1":DRAWP$(A(
Y),2)
280 PMODE0,1:SCREEN1,1
285 LINE(8,6)-(120,80),PSET,B
290 X$=INKEY$:IFX$=" "THEN300ELS
EIFX$="@"THEN965
295 COLOR1,0:LINE(8,6)-(120,80),
PRESET,B:GOTO285
300 Z=Z+1:IFZ=4THENZ=1
305 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
310 X$=INKEY$:IFX$=" "THEN300ELS
EIFX$=CHR$(13)THEN320ELSEIFX$="@
"THEN965
315 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO305
320 IFZ+1=B(4)THEN330
325 NW=NW+1:FORK=1TO5:PMODE0,4:S
CREEN1,1:SOUND10,3:PMODE0,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO305
330 NC=NC+1:PMODE0,4:PCLS1:LINE(
0,40)-(256,126),PRESET,B:LINE(6,
```

INTRODUCING THE WARGAME DESIGNER

TAKE COMMAND! Now you can create your own 1 & 2 player wargames and more. If you are into wargames, science fiction or Dungeons and dragons, you'll love the WGD system.
The completely menu driven system allows you to create your own full color Hi-res icons for units and map features. Take control of the number of units, strength, movement, turn of entry, range of fire, terrain modifiers and objectives. No programming required!
WGD comes with a 23 page manual and 2 flippy diskettes in a rigid vinyl case with these four ready to play scenarios:

INVASION NORTH	a river crossing challenge
ATTACK ON MOSCOW	a historic simulation 1941
ROBOT COMMAND	a si-fi thriller
DUNGEON WARRIOR	save the damsel in distress

Complete WGD system ONLY $29.00 Each scenario available separately with WGD system demo for ONLY $10.00.
COCO 3 128K Disk

GRIDIRON STRATEGY

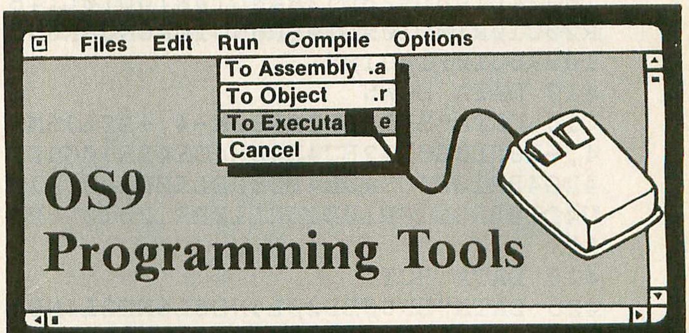
The FIRST and still the BEST 2 player football strategy game for the COCO 3 128K disk.
Over 20 offensive plays and 10 defensive allignments. See the RAINBOW review 8/87. '..fascinating.' Totally unique playing system!
Disk, manual and playing aids only $21.00.

$$$$$$$$$$$ WEEKLY WINNER 2.0 $$$$$$$$$$

A graphics oriented PROVEN WINNER! Features statistical analysis, intuition and luck. Manual contains little known facts about winning number characteristics. Works with all state lotteries. all number combinations.
'I won $90.00 the first time I used it.' KJO, OH
ONLY $10.00

Orders shipped first class FREE within 24 hrs. of receipt.

SPORTSware 1251 S. Reynolds Rd., Suite 414, Toledo, OH 43615
(419) 389-1515



OS9 Programming Tools

• CCENV® PROGRAMMING ENVIRONMENT

CCENV is a mouse-and-menu driver for all OS9 compilers and assemblers. CCENV is interactive and easy to use. A single mouse-click can take a C program from source code to executable module and then run the program in a window. Colorful pull-down menus, popup menus and dialog boxes set all compiler, assembler, and linker options. Temporary files are automatically written on the RAMdisk if available, reducing compile-time. Go from edit mode to compile and back to edit with mouse-clicks. Error messages are saved and can be scrolled in a window during your next editing session.
CCENV maintains configuration files so all options can be rechosen automatically. A PROJECT option implements the MAKE utility, allowing large projects to be split into separate modules until linking. Coupled with CCENV, any OS9 compiler becomes interactive and brisk. You can throw away "CC1." Move over, Turbo C! This is the way programming should be!

CCENV OS9 COMPILER/ASSEMBLER ENVIRONMENT $49.95
with source code $99.95
Requires OS9 Level II, mouse, and any compiler or assembler.
Preset for the MicroWare C Compiler.

• FUNCTION LIBRARIES

C GRAPHICS LIBRARY: The complete CGFX graphics library in C source code and relocatable modules $19.95
C MATH LIBRARY: $19.95
BASIC09 FORMAT .... $ 9.95 Both $24.95
BASIC09 MOUSE & MENU LIBRARY: Create mouse-driven applications with pulldown menus from BASIC09. Includes UNDERSTANDABLE directions for using mice and menus in OS9. $14.95

(please add $2.50 S/H) (509) 783-5132
* FoxWare 5101 W. 12th Kennewick, WA 99337 *

```
44)-(124,122),PRESET,B:LINE(130,
44)-(248,122),PRESET,B:PAINT(2,4
2),0,0
335 DRAW A$(5):DRAWP$(A(Y),1)
340 DRAW A$(6):DRAWP$(A(Y),2)
345 SCREEN1,1
350 X$=INKEY$:IFX$<>CHR$(13)THEN
350
355 PMODE0,1
360 PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO965
365 PMODE0,2:PCLS1:SCREEN1,1:LIN
E(0,40)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
0,44)-(248,122),PRESET,B:PAINT(2
,42),0,0
370 FORI=1TO20:DRAW A$(5):DRAWP$
(I,1)
375 DRAW A$(6):DRAWP$(I,2)
380 X$=INKEY$:IFX$<>CHR$(13)THEN
380
385 COLOR1,0:LINE(8,46)-(122,120
),PSET,BF:LINE(132,46)-(246,120)
,PSET,BF:NEXTI
390 RUN
395 DATA"BR60BD4F20L10D24L20U24L
10E20BD52BL14D10R10U10BR8ND10R10
D6L10"
400 DATA UP
405 DATA"BR60BD4L10D24L10F20E20L
10U24L10BD52BL32R4ND10R10D10L14B
R20U10R10D10NL10BR6NU10R6NU8R6NU
10BR6U10F10U10"
410 DATA DOWN
415 DATA"BR16BD20R80M-4,+20L36M-
4,-18NL36BR12BU4E4UH4UE4BR10G4DF
4DG4BR10E4UH4UE4BD50BL50D10U6R10
U4D10BR8U10R10D10NL10BR12U10L6R1
2"
420 DATA HOT
425 DATA"BR60BD20L4ND6L6ND2L4ND4
L2M+16,+32M+16,-32L16R4ND8R6ND4R
6L2U4H2U2H2L2H2L12G2L2G2D2G2D4BD
36BL10L10D10R10BR8U10R10D10NL10B
R8NU10R10BR6R14U10L14R4D10"
430 DATA COLD
435 DATA"BR10BD14R26F4D16G4L22NU
24D24L4R26E4U16H4BR12U24NL4NR4D4
8NL4R4BR10H4U40E4R16F4D10BD10NL1
6D20G4L14BR24R4U30R4U10R2U10E2U6
RD6F2D10R2D10R4D30R4L22BR8BU2U24
BR4D24"
440 DATA BIG
445 DATA"BR38BD56D8R4BR4U8BR4R2N
D8R2BR4R2ND8R2BR4D8R4BR4NR4U4NR4
U4NR4BU6BL6H4L4U2NR4D2L4NUND4L4U
2L4D2R4NH6L2G4"
450 DATA LITTLE
455 DATA"BR24BD36E12G6F20R20E20F
6H12BL14H2G4L4H4G2BU10BL4NU4L2U6
E4R2BR26L2G4D6L2U4BD56BL46U10D4R
10U4D10BR6U10NR10D4R10U4D10BR6U1
0R10D4L10D6BR16U10R10D4L10BR18BD
6U6NH4NE4"
460 DATA HAPPY
465 DATA"BR34BD50H12F6E12R36F12G
6E12BU16BL28H2G4L4H4G2BU10BL4NU4
L2U6E4R2BR26L2G4D6L2U4BD58BL34R1
0U6L10U4R10BR6NR10D4NR10D6BR10NU
10BR6R4U10L4R14D10L10"
470 DATA SAD
475 DATA"BR20BD22D20M+30,+10NU20
R50U20NL50M-30,-10ND8L50M+30,+10
M-30,-10E20R50G20L10NE20L10NE20L
10NE20L10NE20BD34BR6NR10D10R10NU
10BR6U10R6D4L6D6BR12NR6U6NR6U4R6
BR6ND10F10U10"
480 DATA OPEN
485 DATA"BR12BD16D20M+30,+10NU20
R60U20NL60M-30,-10L60M+30,+10R12
M-30,-10R12M+30,+10R12M-30,-10R1
2M+30,+10BD40BL78NR10U10R10BD10B
R6NU10R8BR6U10R10D10NL10BR6R10U6
L10U4R10BR6NR6D4NR6D6R6BR6R4NU10
R10U10L14"
490 DATA CLOSED
495 DATA"BR90BD52U2E8U32H4L4G2D1
0F2R4E4BL12U12H4L4G4D12F4R4E4BL1
2U12H4L4G4D12F4R4E4BL12U12H4L4G4
D12F4R4E4BL12D2G4L4M-10,-6M-10,-
2L2G4D4M+8,+4D2M+20,+12F10M+6,+2
F2BE10H10M-8,-3BD36BL20NU10R10BR
6NR8U6NR8U4R8BR6NR10D4NR10D6BR22
U10L6R12"
500 DATA LEFT
505 DATA"BR28BD52U2H8U32E4R4F2D1
0G2L4H4BR12U12E4R4F4D12G4L4H4BR1
2U12E4R4F4D12G4L4H4BR12U12E4R4F4
D12G4L4H4BR12D2F4R4M+10,-6M+10,-
2R2F4D4M-8,+4D2M-20,+12G14G2BH10
E10M+8,-3BD24BL40ND10R10D4L10R4F
6BR6NU10BR6U10NR10D10R10U6NL4BR6
NU4ND6R10U4D10BR10U10L6R1
510 DATA RIGHT
515 DATA"BR30BD6D34R4E2U10R12F4R
12E4R12F4D12R10U20H8L18H4L4U8R12
U4L28D4R12D8L4G4L12U8H2L4BM+60,+
40F4D4G2L4H2U4E4BL54BD10D10R6NU8
R6NU10BR6NR8U6NR8U4R8BR6R6ND10R6
"
520 DATA WET
525 DATA"BR30BD6D34R4E2U10R12F4R
12E4R12F4D12R10U20H8L18H4L4U8R12
U4L28D4R12D8L4G4L12U8H2L4BD50BR8
R4ND10R10D10NL14BR6U10R10D4L10R4
F6BR10U6NH4E4"
530 DATA DRY
535 DATA"BR10BD40R102L8E10M-8,+4
L6U4H2L2G4R4D4F4L20E10M-8,+4L6U4
H2L2G4R4D4F4L20E10M-8,+4L6U4H2L2
G4R4D4F4L20E20M-16,+8L12U8H4L4G8
R8BE4NLBG4D8F8"
```

```
540 DATA FIRST
545 DATA BR2
550 DATA LAST
555 DATA"BR56BD26M+18,+5F8LH2L2G
2H2L2G2H2L2G2H2L2G3D11GLNHREU11H
3L2G2H2L2G2H2L2G2H2L2G2E8M+18,-5
BU10R10E4NH4R6E4U2H4L10G4L12NG4H
6L8G4D6F4R6F4R4E2R2R6R4BR16NE6NR
20NF6BD50BL50U10R10D10NL10BR6BU4
NU6F4E4U6BR6NR10D4NR10D6R10BR6U1
0R8D4L6F6"
560 DATA OVER
565 DATA"BR56BD2M+18,+5F8LH2L2G2
H2L2G2H2L2G2H2L2G3D9GLNHREU9H3L2
G2H2L2G2H2L2G2H2L2G2E8M+18,-5BD3
6NE6NH6NG6NF6BR16NE6NF6R22BD28BL
74NU10R10NU10BR6U10F10NU10BR6R4U
10L4R14D10NL10BR6NR10U6NR10U4R10
BR6ND10R8D4L8R2F6"
570 DATA UNDER
575 DATA"BR16BD20E2NR80R16E8R6NG
4R6NG4R6NG4R6NG4R6NG4R6NG4NG4R6N
G4R6NG4R6NG4R6NG4F8D2G8NH4L6NH4L
6NH4L6NH4L6NH4L6NH4L6NH4L6NH4L6N
H4L6NH4L6H8L16NR80BD46BR10NU10R8
BR6NU10BR6U10R10BD4NL4D6NL10BR6U
6NU4R10U4D10BR12U10L6R12"
580 DATA LIGHT
585 DATA"BR26BD46R68M-14,-30L10U
6H4L12G4D6L10M-14,+30BR18BU8U12B
R6NR6D12R6NU12BR6U12R6D12NL6BR4N
U6BR4NU6U4R4D4L4BU22BL14L4U4R4D4
BD50BL36U10D4R10U4D10BR6NR10U6NR
10U4R10BR6ND10R10D4NL10D6BR6BU4N
U6F4E4U6BR6F4ND6E4"
590 DATA HEAVY
595 DATA"BR60BD48R8E4U10R4U6L4U6
H4L16G4D6L4D6R4D10F4R8BU6NE4NH4B
U8NLNR2BU6BL4NR2BR6R2BU16R6E2H2L
20G2F2R12BD20BL20H16D16F16R36E16
U16G16BD34BL50U10R10BD4NL4D6NL10
BR6U10R10D10NL10BR6U10R10D10NL10
BR6R4NR10U10L4R14D10"
600 DATA GOOD
605 DATA"BR60BD48R8E4U10R4U6L4U6
H4L16G4D6L4D6R4D10F4R8BU10NG4NF4
BU4NLNR2BU6BL4NR2BR6R2BU12E6D8L2
0U8F6BL20D6G4L6NU10ND20L6H4U6BR7
8NG4NF4D20G10BD20BL48U10R10D4NL1
0D6NL10BR6U6NR10U4R10D10BR6R4NR1
0U10L4R14D10"
610 DATA BAD
615 DATA"BR20BD16D30NR56U30R6U16
R10F4G4L10D8R10D6R10D6R10D6R10D6
R10D6R26BU42BL30L20NE4NF4BD52BL2
0D10U6R10U4D10BR8NU10BR8NR10U10R
10BD4NL4D6BR6U10D4R10U4D10"
620 DATA HIGH
625 DATA"BR20BD16D30NR56U30R16D6
R10D6R10D6R10D6R10D6R26L16U16R10
F4G4L10D8BU26BR6NU16NH4NE4BD46BL
50NU10R8BR6U10R10D10NL10BR6NU10R
6NU8R6U10"
630 DATA LOW
635 DATA"BR32BD26NR50D2NR50D2R50
D6L2D4R14U4L2U12H2U4H2U2H4L6D2F2
D2F2D8BL50BD30D4ND6R10D6U10BR6ND
10R10D4NL10D6BR6U10R10D4L10R4F6B
R6R4NU10R10U10L14"
640 DATA HARD
645 DATA"BR36BD18H8U8R8F8E4R20F4
E8R8D8G8D10G4D2G8L2G4L8H4L2H8U2H
4U10BR10BD4R4NU2ND2NR4NE2NH2BR12
R4NU2ND2NR4NE2NH2BG8BD4NE4NH4D6N
F4NG4U6BR6NR20BL12NL20BR6D4BF4NF
10BH4BG4G10BL14BD14R10U6L10U4R10
BR6ND10R10D10NL10BR6U6NR10U4R10B
R6R6ND10R6"
650 DATA SOFT
655 DATA"BR30BD2D10NR30D4NR30L2D
4L2D4L2D4L2D12NR88D6R8NU6R8NU6R8
NU6R8NU6R8NU6R8NU6R8NU6R8NU6R8NU
6R8NU6R8U6U4H4M-10,-4L4ND10M-30,
-10NU16NE6D4M+30,+10BL58ND8NH8BD
22BR16ND10R10D10NL10BR6U10F10U10
"
660 DATA ON
665 DATA"BR26BD2D14L2D4L2D4L2D4L
2D12F6R20E2R30F2R14E2F2R10E2U6H2
L10H2L8M-30,-10H4U18BL18BD20G4D4
F4BD20D10R10U10NL10BR6NR10D4NR10
D6BR16U6NR10U4R10"
670 DATA OFF
675 DATA"BR20BD6ND20R80G10NL50M+
10,+30G4L62H4M+10,-30H4L8D14L6BD
30BR16NR10D4NR10D6BR16NU10R10NU1
0BR6NU10R8BR4NU10R8"
680 DATA FULL
685 DATA"BR20BD6ND20R80G10M+10,+
30G4L62H4M+10,-30H4L8D14L6BD30NR
10D4NR10D6R10BR6U10R6ND6R6D10BR6
U10R10D4NL10BR6BU4R6ND10R6BR6F4N
D6E4"
690 DATA EMPTY
695 DATA"BR50BD14ND20R12D10NL12N
D10BR8R6NU6ND6R6BR10U18L60D36R60
U18BD30BL60NL4ND10R10D4NL10D6NL1
4BR6NR10U6NR10U4R10BR6BD10R10U6L
```

PREMIUM COCO3 512K UPGRADE

- Made in USA by J&R Electronics
- Memory chips socketed, user replaceable
- Rugged, long life construction
- Top mounted Memory for cooling
- Heavy duty POWER and GROUND planes to minimize memory errors due to noise
- High performance design, permits use of less expensive 150ns memory chips
- We supply Prime memory chips, not inferior pulls or fallouts*
- Includes RAMDISK, Spooler and Memory Test software on disk with 28 page User's Manual (We set the standard for 512K support software. We believe our software is uniquely powerful, as opposed to those 'Me, too' companies that charge extra for software with much less power!)

SPECIAL PRICES

#1010-**29.95** JramR bare board plus connectors and software

#1014-**39.95** JramR assembled & tested 0K (No memory chips) and software

*CALL (for latest price of #1014 with memory chips and other products)

To place an order, write to: **J&R Electronics, P.O. Box 2572, Columbia, MD 21045,**
OR call **(301) 987-9067**-Jesse or **(301) 788-0861**-Ray

```
10U4R10BR6R6ND10R6"
700 DATA BEST
705 DATA"BR50BD14ND20R12BD10NL12
BR8R12BR10U18L60D36R60U18BD30BL7
0D10R6NU8R6U10BR6ND10R10D10NL10B
R6U10R10D4L10R4F6BR6R10U6L10U4R1
0BR6R6ND10R6"
710 DATA WORST
715 DATA"BR30BD4ND6R60D6NL60D4L6
0NU4G4D28F4R60E4U28H4BL20BD32H4L
4U2NR4D2L4NUND4L4U2L4D2R4NH6L2G4
BD10BL26ND10BR6ND10F10U10BR6BD10
R10U6L10U4R10BR6ND10BR6R4ND10R10
D10NL14BR6NR10U6NR10U4R10"
720 DATA INSIDE
725 DATA"BR12BD4ND6R60D6NL60D4L6
0NU4G4D28F4R60E4U28H4BR36BD32H4L
4U2NR4D2L4NUND4L4U2L4D2R4NH6L2G4
BD10BL76ND10R10D10NL10BR6NU10R10
U10BR6R6ND10R6BR6BD10R10U6L10U4R
10BR6ND10BR6R4ND10R10D10NL14BR6N
R8U6NR8U4R8"
730 DATA OUTSIDE
735 DATA"BR16BD30NR30U2NR30U2R18
BR4R2BR4R2BL30U2R90G12M-48,+4U10
BD36BL22R10U6L10U4R10BR6D10U6R10
U4D10BR6U10R10D4NL10D6BR6U10R10D
4L10R4F6BR6U10R10D4L10"
740 DATA SHARP
745 DATA"BR16BD30NR40H2U4E2R40ND
8R48F2D2G2L2G2L2G2L36H2BD36BL28R
4NU10R10U10NL14BR6D10R10U10BR6D1
0R8BR6NU10R8"
750 DATA DULL
755 DATA"BR22BD6R30D6F4R8E4U6R30
D16L8NU16L8D26L22NU30L22U26L8NU1
6L8U16BD60NR10U10R10BR6D10R8BR6N
R10U6NR10U4R10BR6ND10R10D4NL10D6
BR6U10F10U10"
760 DATA CLEAN
765 DATA"BR22BD6R30D6F4R8E4U6R30
D16L8NU16L8D26L8NU12L4NU20L2NU8L
4NU6L4NU30L8NU12L4NU20L2NU8L4NU6
L2NU18L2U26L8NU16L8U16BD50R4ND10
R10D10NL14BR8NU10BR8U10R10D4L10R
4F6BR6BU10R6ND10R6BR6F4ND6E4"
770 DATA DIRTY
775 DATA"BR20BD30NR84BD36BL6R10U
6L10U4R10BR6ND10R6ND8R6D10BR6U10
R10D10NL10BR6U10R10D10NL10BR6BU1
0R6ND10R6BR6D10U6R10U4D10"
780 DATA SMOOTH
785 DATA"BR14BD30BRE4R4F4R4E4R4F
4R4E4R4F4R4E4R4F4R4E4R4F4R4E4R4F
4BL84BD36U10R10D4L10R4F6BR6U10R1
0D10NL10BR6NU10R10NU10BR6U10R10B
D4NL4D6NL10BR6U10D4R10U4D10"
790 DATA ROUGH
795 CLS:V=1
800 FORI=1TO20
805 AO(I)=RND(20)
810 IF N(AO(I))=1 THEN 805
815 N(AO(I))=1:NEXTI
820 FOR P=1TO20
825 CLS
830 PRINT@68,"WHAT IS THE OPPOSI
TE OF"
835 PRINT@132,C$(AO(P))+" ?"
840 FOR Q=1TO2
845 C(Q)=RND(20):IF C(Q)=AO(P) T
HEN845
850 FOR K=Q-1 TO 0STEP-1:IF C(K)
=C(Q) THEN845
855 NEXTK
860 NEXTQ:C(3)=AO(P)
865 FOR E=1TO3
870 F(E)=RND(3)
875 FOR K=E-1 TO 0 STEP-1:IF F(K
)=F(E) THEN870
880 NEXTK:NEXTE
885 PRINT
890 PRINTTAB(8)"1-"+B$(C(F(1))):
PRINT
895 PRINTTAB(8)"2-"+B$(C(F(2))):
PRINT
900 PRINTTAB(8)"3-"+B$(C(F(3))):
PRINT
905 G$=INKEY$:IFG$="@"THEN965
910 IF G$=""THEN905
915 G=VAL(G$)
920 IF G<1 THEN 905
925 IF G>5 THEN 905
930 IF C(F(G))<>AO(P) THEN945
935 PRINT:PRINT"  RIGHT! THE ANS
WER IS: "+B$(AO(P))
940 NC=NC+1:GOTO955
945 PRINT:PRINT"  SORRY! THE AN
SWER IS: "+B$(AO(P))
950 NW=NW+1
955 X$=INKEY$:IFX$<>CHR$(13)THEN
955
960 NEXT P
965 CLS:PRINT@101,"YOU TRIED"NC+
NW"TIMES &":PRINT@165,"ANSWERED"
NC"CORRECTLY"
970 PRINT@229,"WHILE DOING"NW"WR
ONG."
975 NQ=NC+NW:IF NQ=0THEN NQ=1
980 MS=INT(NC/NQ*100)
985 PRINT@293,"YOUR SCORE IS"MS"
%."
990 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
995 X$=INKEY$:IFX$="Y"THEN RUN
1000 IFX$="N"THENCLS:END
1005 IFX$="C"THEN1015
1010 GOTO995
1015 IFV=1THEN825
1020 IFV=0THEN280
```

Now from NRI comes the first course of its kind . . . anywhere!

Learn to use, program, and service today's digital electronic music equipment as you build your own computer-controlled music center

Now NRI puts you at the heart of the most exciting application of digital technology to date! With NRI's new at-home training in Electronic Music Technology, you get hands-on experience with the equipment that's revolutionizing the music industry—Atari ST Series computer with built-in MIDI ports, Casio CZ101 digital synthesizer with advanced MIDI capabilities, and ingenious MIDI software that links computer keyboard to synthesizer keyboard—all yours to train with and keep.

This year, over $1.5 *billion* worth of digital electronic music instruments—keyboards, guitars, drum machines, and related equipment—will be sold in the U.S. alone. Who's buying this new-tech equipment? Not just progressive musicians and professional recording technicians, but also thousands of people who have never touched a musical instrument before. And there's good reason why.

Something called MIDI (Musical Instrument Digital Interface) has suddenly transformed musical instruments into the ultimate computer peripherals . . . and opened up a whole new world of opportunity for the person who knows how to use, program, and service this extraordinary new digital equipment.

Now NRI's breakthrough Electronic Music Technology course puts you at the forefront of this booming new technology with exclusive hands-on training built around a MIDI-equipped computer, MIDI synthesizer, and MIDI software you keep.

Dynamic New Technology Opens Up New Career Opportunities for You

The opportunities are unlimited for the person who's trained to take advantage of today's electronic music phenomenon. Now you can prepare for a high-paying career as a studio technician, sound engineer, recording engineer, or road technician . . . even start your own new-age business providing one-stop sales and service for musicians, technicians, and general consumers alike. Or simply unleash your own musical creativity with the breakthrough training and equipment only NRI gives you.

Only NRI Gives You an Atari ST Computer, Casio Synthesizer, and Innovative MIDI Software You Train With and Keep

The Atari ST Series computer included in your course becomes the heart of your own computer-controlled music center. With its tremendous power, superior graphics capabilities, and built-in MIDI interface, the 16/32-bit Atari ST has almost overnight become the computer of choice for today's most knowledgeable electronic musicians.

The Casio CZ101 digital synthesizer, also included in your training, is the perfect complement to your Atari ST. The polyphonic, multitimbral CZ101—which stores up to 32 voices internally—"communicates" with your ST computer through MIDI, bringing life to virtually any sound you can imagine.

Plus, you get ingeniously designed MIDI software that opens up amazing new creative and technical possibilities . . . you actually build your own 4-input audio mixer/amplifier . . . and you test the electronic circuits at the core of today's new-tech equipment with the hand-held digital multimeter included in your course.

No previous experience necessary—in electronics or music!

No matter what your background, NRI gives you the skills you need to take advantage of today's opportunities in electronic music technology.

With your experienced NRI instructor always available to help, you master the basics of electronic theory step by step, gaining the full understanding of electronics that's now so essential for technicians and musicians alike. You move on to analyze sound generation techniques, digital logic, microprocessor fundamentals, and sampling and recording techniques . . . ultimately getting first-hand experience with today's explosive new technology as you explore MIDI, waveshaping, patching, sequencing, mixing, special effects, and much more.

Plus, even if you've never been involved with music before, NRI gives you enough basic training in music theory and musical notation to appreciate the creative potential and far-reaching applications of today's electronic music equipment.

Send Today for Your FREE Catalog

For all the details about NRI's innovative new training, send the coupon today. You'll receive a complete catalog describing NRI's Electronic Music Technology course plus NRI courses in other high-tech, in-demand electronics fields.

If the coupon is missing, write to NRI School of Electronics, McGraw-Hill Continuing Education Center, 3939 Wisconsin Avenue, Washington, DC 20016.

NRI School of Electronics
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, DC 20016

For Career courses approved under GI Bill
☐ check for details.

☑ **CHECK ONE FREE CATALOG ONLY**

- ☐ Electronic Music Technology
- ☐ TV/Video/Audio Servicing
- ☐ Computers and Microprocessors
- ☐ Basic Electronics

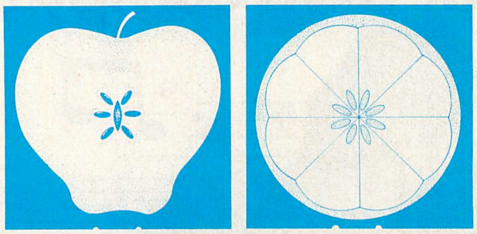
Name (Please Print) Age

Street

City State Zip

Accredited by the Accrediting Commission of the National Home Study Council #205-088

A routine to convert a machine language program into BASIC



ML-DATA

By Stephen Miller

Many times I get programs that try in vain to load a machine language subroutine program, or my favorite picture needs two or three disks in order to dump it to the printer.

I worked out a routine to take an ML program in memory and convert it into BASIC DATA lines that can be added to a program and keep the entire kit together. I was doing some experiments with the saving of ASCII files when it became apparent that this mixing of apples and oranges could in fact be done.

Before loading the program, type in and enter CLEAR size and address for the ML program. Then load *ML-Data* and run it. The opening prompts will again ask you for the CLEAR parameters and the filename for the ML subroutine you want to transfer. Remember to use &H for the address. You will also be asked for the "line number to return to." After the BASIC program created by *ML-Data* pokes in its ML code, it has to know where to go in your BASIC program. Then the program will load the ML package and ask you for the start and end addresses for the ML program. The program will open a data file on disk, then send out to the disk the READ and POKE information to reconstruct your ML routine later. Sit back and watch the fun.

The program will look in memory at the ML program and assign the HEX notation found to A$. Once 70 bytes have been accumulated, A$ will be dumped to the disk and reset, and the program will continue to build the next DATA line number. All along, you will be able to view the complete line number and present addresses flashing by. Once it reaches the end address, the program will close the file and indicate that the job is done.

Now load in your BASIC program where you want the *ML-Data* package to go. Make sure you have room above Line 10000. Now enter MERGE"DATAFILE". This program will then create a new Line 0 to clear the memory for the ML routine. When this is done, call up a list. When you're ready to use your ML package, use the EXEC&H*xxxx* command where needed. You could also use the DEFUSR command if information is needed between BASIC and ML.

A simple little routine to save a lot of time, fingers, eyes and late hours!

Stephen Miller is an electronics hobbyist who enjoys hardware-hacking on his CoCo 2 and 3. He was one of the first CoCo 3 owners in Canada.

(Questions or comments concerning this program may be directed to the author at P.O. Box 5000, Penetanguishene, Ontario, Canada L0K 1P0. Please enclose an SASE when requesting a reply.) ☐

The listing: `ML-DATA`

```
1 '******************************
2 '*       STEPHEN MILLER        *
3 '*         P.O.BOX 5000        *
4 '* PENETANGUISHENE,  ONTARIO *
5 '* CANADA              L0K 1P0 *
6 '******************************
10 CLEAR700
20 CLS:PRINT" THIS PROGRAM WILL
TAKE A M/L   PROGRAM IN MEMORY,
AND CREATE A BASIC 'DATA' FILE F
OR A LOADER  ROUTINE YOU CAN ADD
 INTO A BASICPROGRAM.  THE DATA
FILE WILL USELINE '0',AND LINES
10000 AND UP.
30 INPUT"HOW MUCH STRING SPACE T
O CLEAR ";CL:PRINT"USE HEX VALUE
S AND USE '&H'":INPUT"CLEAR AT W
HAT ADDRESS ";CL$:INPUT"WHAT LIN
E NUMBER TO RETURN TO    ";LN
40 INPUT"enter M/L FILENAME: ";N
$:LOADMN$
50 PRINT:INPUT"enter START ADDRE
SS OF M/L IN    MEMORY: ";ST:PRIN
T:INPUT"enter ENDING ADDRESS OF
M/L IN  MEMORY: ";EN
60 Y=10001
70 OPEN"O",#1,"DATAFILE.BAS"
80 CLS:A$="0 CLEAR"+STR$(CL)+","
+CL$+":GOTO10000":PRINTA$:PRINT#
1,A$:A$="10000 FORADD=&H"+HEX$(S
T)+" TO&H"+HEX$(EN)+":READINF$:P
OKEADD,VAL("+CHR$(34)+"&H"+CHR$(
34)+"+INF$):NEXT:GOTO"+STR$(LN):
PRINTA$:PRINT#1,A$
90 A$="DATA "
100 FORT=ST TOEN:Z=Z+1:IFZ=>70TH
ENGOSUB130
110 D$=HEX$(PEEK(T)):A$=A$+D$+",
":NEXT:GOSUB130
120 CLOSE:PRINT@392,"finished: &
H"HEX$(T-1):END
130 A$=LEFT$(A$,LEN(A$)-1):A$=ST
R$(Y)+" "+A$:A$=RIGHT$(A$,LEN(A$
)-1):Y=Y+1
140 CLS:PRINT@32,A$:PRINT@392,"a
ddress: &H"HEX$(T)
150 PRINT#1,A$
160 Z=0:A$="DATA ":RETURN
```

Handicappers

FOOTBALL: Looking for a quick, easy way to handicap NFL games? Then you need Pigskin Predictions, our bestselling NFL handicapper. No struggling with meaningless statistics! Easy once-a-week entry of scores. Predicts point spreads, displays schedule by week or team, shows real or projected standings at any point in the season. Seven different reports to screen or printer. Seeing this one is believing! Runs on any CoCo with 32K and a disk drive. Only $39.95

RACING: Use your Color Computer to improve your performance at the track! Handicappers for **Thoroughbreds, Harness Horses and Greyhounds** quickly rank the contestants in each race, even if you've never handicapped before. All the information you need is readily available in the track program or *Racing Form*. Thousands of satisfied customers since 1983! Thoroughbred, Harness or Greyhound handicappers, only $39.95 each. Runs on **any CoCo**, tape or disk.

Federal Hill Software
8134 Scotts Level Road
Baltimore, Md. 21208
Info 301-521-4886

Visa-MC Welcome
Toll Free Orders
800-628-2828 Ext. 850

NEW, LOW PRICES!
SAVE 40% TO 33%

MONEY-BACK GUARANTEE!
COMPATIBLE WITH COCO 3!

SCREENPRINTS ON ANY PRINTER!!

Picture Perfect

GRAPHIC SCREENPRINT PROGRAM
FULL-PAGE PRINTOUTS WITH—

RADIO SHACK: LPVII, LPVIII, DMP100, DMP105, DMP106, DMP110 DMP120, DMP130, DMP130A, DMP200, DMP430, CGP220.

EPSON/IBM: ALL COMPATIBLE PRINTERS - MX/RX/FX/EX/LX/LQ SERIES, STAR GEMINI 10X/15X, NX10/15, NX1000.

AND: ZENITH MPI99, NORTH ATLANTIC QANTEX, BROTHER DM-40, CANON INK-JET, PANASONIC, C-ITOH AND LEADING EDGE PROWRITER, OLIVETTI INK-JET, TOSHIBA, OKIDATA, GORILLA BANANA, AND MORE!!

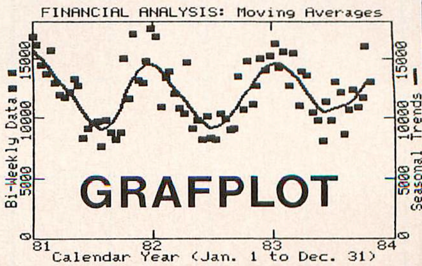
ONLY $15.00(US) ON DISK OR TAPE

TURN DATA INTO ARTWORK WITH—

LOADS SPREADSHEETS
AUTO SCALES & LABELS
SMOOTHS & INTEGRATES
291 GRAPHING SYMBOLS
UNLIMITED OVERLAYS
STORE COMPLETE GRAPHS
MANUAL & TUTORIAL

SPECIFY PRINTER WITH YOUR ORDER!

TAPE: $25.00 (US)
DISK: $30.00 (US)



SEND CHECK OR MONEY ORDER TO:
HAWKES RESEARCH SERVICES: 859 STANFORD AVE, OAKLAND, CA 94608
FOR INFORMATION - (415) 547-7557. SHIPMENT WITHIN 48 HOURS!
ADD $3.00 SHIPPING ON ALL ORDERS. CA. RESIDENTS ADD SALES TAX

Create great games and Simulations in CoCo's own language

The Little Graphics Library

By Kevin Dowd

There's nothing like the speed of machine language graphics! In this article I'll show you building blocks and a method for creating fast, high-quality assembly language games and Simulations.

Think of the screen as a stage. We will decide who the players will be, perhaps meteors and spaceships or mice in a maze. We'll decide how they should interact (i.e. what happens if a mouse encounters a spaceship). In general, however, we'll keep loose control, allowing our players to move freely within the restrictions we choose. We could even play, too. The important thing is that we are going to let the players drive the program, rather than let the program drive the players.

Kevin Dowd is a technical support analyst with Multiflow Computer, Inc. He bought his first Color Computer in 1982 and hasn't gone to bed on time since.

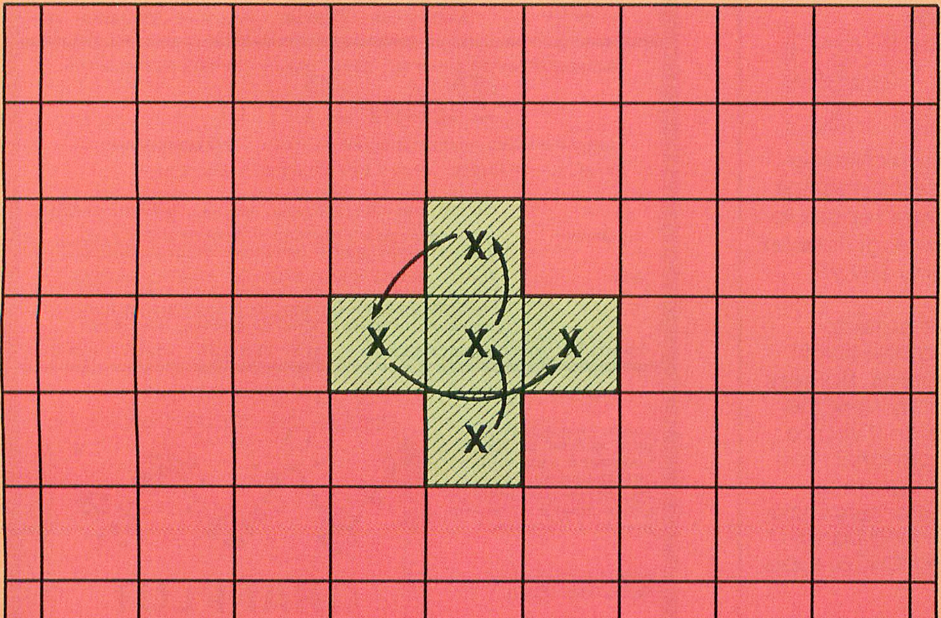


Figure 1: Demonstration of Little Graphics Language

You'll need an assembler and familiarity with the 6809 assembly language, the machine language of your Color Computer. We'll explore a number of programs and incrementally build on a library of subroutines. I will tell you about the new routines as we use them, so you needn't have them all keyed in to get started.

To write any graphics game we'll need to be able to move and monitor objects on the screen. Let's start at the very beginning with a method for drawing a picture, independent of giving it movement.

Statics

Let me introduce something I call *The Little Graphics Language* (*LGL*). Picture the screen as a piece of graph paper; imagine that you are going to draw something in a pattern of neighboring squares, one at a time. In each step you are allowed to color in the square where you are and/or move to another, vertically, horizontally or diagonally. This completely describes the procedure for programming with

LGL. The drawing in Figure 1 and the following example show how to construct a blue plus sign three pixels wide and three pixels high:

BLUEUP	write a blue pixel, move cursor up
BLUEUP	write a blue pixel, move cursor up
BLUEDL	write a blue pixel, move down and left
BLUERT	write a blue pixel, move right
RIGHT	move right
BLUE	write a blue pixel
DONE	

We drew three blue pixels vertically, moved down and to the left and drew another, and then moved right two pixels and drew a final blue pixel. Be sure to note that first we draw and then we move. I will be referring to pictures we have drawn with *LGL* as "shapes."

PROG1	$6800	$6E71	$6800
PROG2	$6800	$6E9D	$6800
PROG3	$6800	$6EA8	$6800
PROG4	$6800	$71A0	$6800

Table 1: Final Start, End and Execute addresses for PROG1 through PROG4 when assembled with LIBRARY.

Having described how it's constructed, we can draw this shape on the screen; first, however, we have to choose where it will be drawn. Any screen location will suffice as long as it's between the first possible location (Pixel 0) and the last (Pixel 12287 for the graphics mode I've chosen). Pixels are numbered starting with 0 at the upper left of the screen and progressing to the right until they wrap around on the next line.

> ***"To write any graphics game we'll need to be able to move and monitor objects on the screen."***

The program shown in Listing 1 is for drawing the plus sign. It uses the subroutines VIDEO, VRAMCO, WRTSHP, NXTSET. At a minimum these routines must be included with PROG1, along with the tables listed at the end of the library (Listing 5). First, enter and save the code for Listing 5. Use the filename LIBRARY.ASM. Then type in Listing 1, and merge in LIBRARY.ASM according to your assembler, assembling the programs together. You will need to resave the binary file with the addresses shown in Table 1. Each of the listings 1 through 4 must be assembled *with* Listing 5 or parts of it, at least. You will need to leave out comments for Listing 4.

With PROG1 we make a major accomplishment: drawing our first "static" picture, following these important steps:

1) Pick a screen location and store it into SCRLOC (screen location), a variable representing the number of the pixel where the shape will be drawn.

2) Translate SCRLOC into actual video RAM coordinates with a call to VRAMCO. The CoCo allows you to reserve any part of memory for use as video RAM, the memory containing the picture on the screen. I've chosen to locate our video RAM starting at Location 29696, so whenever we talk about Screen Location 0 we are actually referring to Memory Location 29696. In fact, the first four pixels are packed into that first video RAM location.

VRAMCO generates two values called VLOC and VBIT. VLOC describes the pixel's address in RAM; since there is more than one pixel per byte, VBIT is used to describe which of the four possible pixels to use.

3) Put the address of PLSSGN into STSH (start of shape). STSH is read in the next step.

4) Call WRTSHP to draw the plus-sign on the screen. WRTSHP reads *LGL* instructions starting from the address stored in STSH until it reaches the DONE instruction.

5) Loop forever. Press the reset button to return control of your CoCo.

Dynamics

We could move the plus sign the way a cartoonist does, by repeatedly drawing it farther and farther off in one direction. But in our case we had better erase the character from its old location, lest we produce a smear. To this end, PROG1 can be modified to loop with a continously changing value of SCRLOC. To move right, add a value of one each iteration. To move up or down, add or subtract a whole line at a time — 128 pixels. Perhaps we want a continuous diagonal movement. This quantity of movement is called a "vector", one of

Subroutine Summary

VIDEO — INPUTS: none
MODIFIES: CC,A,X.
OUTPUTS: none
For setting up video parameters, erasing the screen and the C-list.

VRAMCO — INPUTS: SCRLOC
MODIFIES: CC,D
OUTPUTS: VLOC, VBIT
Translates a screen location (pixel number) into actual video RAM coordinates. SCRLOC is usually set by the programmer. The outputs, VLOC and VBIT, give the video RAM address and pixel number (0 to 3) at that address. These are never set by hand. This routine must be called before adding a character to the C-list or drawing a static shape on the screen.

WRTSHP — INPUTS: STSH, VLOC, VBIT
MODIFIES: CC,D,Y, video RAM, TLOC, TBIT
OUTPUTS: none
Draws a picture according to the *LGL* intructions at the memory address contained in STSH. The value of STSH is either set by hand or by a call to SHPADR. The placement of the shape on the screen is determined by the values in VLOC and VBIT. These are either set by VRAMCO or extracted from the C-list by GETLOC.

NXTSET — used internally. Updates the cursor position according to the *LGL* instructions.

ADDCHL — INPUTS: SHAPE, SCRLOC, AUX, VLOC, VBIT, VOUT the qualities a "character" possesses in addition to its shape. Here's a sample vector for moving two pixels right and one pixel down:

right + right + down = 1 + 1 + 128
= 130

Byte #	Also known as	Purpose
0	XSHAPE	byte number identifying what type of character this is (i.e. mouse or spaceship?). It must be an even number.
1-2	XSCLOC	screen location where the character last moved.
3	XAUX	User-defined purpose.
4-5	XVLOC	Video RAM location corresponding to XSCLOC. It was generated by a call to VRAMCO.
6	XBIT	Pixel offset in XVLOC. Also generated by VRAMCO.
7-8	XVECT	Character's vector.

Figure 2

A character's new location can be calculated from its old location by adding the old location and the vector together.

If we set off hard-coding a loop to guide the movements of 100 characters, we'd soon find ourselves short on patience — not to mention program memory! More desirable is having some kind of method for handling a large number of characters in a uniform way. For that purpose I propose a character list, or C-list. The C-list is an area of memory we've reserved and divided into 100 little compartments, each containing information about the state of one active character. Updating the screen will be done by passing through the C-list and updating each entry. (Imagine this as a nursery with 100 cribs. The nurse looks into each in turn, skips the empty ones and attends to those with babies inside. In each of the programs we construct, we will include one "main loop" to pass through the C-list the same way the nurse checks over the cribs.)

The information stored in the C-list is necessary for tracking characters, i.e. vectors and video RAM locations. A list of the contents of each of the nine bytes of a single C-list entry is shown in Figure 2.

As a convention, any slot with a character number (XSHAPE) of zero is considered empty and can be subsequently filled in. Similarly, if we want to delete a character from the game, we simply set its C-list entry (XSHAPE) to zero.

It is very useful to have the addresses for the *LGL* routines all gathered into one area called a "shape table." That way, when we are stepping through the C-list and come across a character/shape number of 12, for example, we can quickly look in the twelfth shape table entry to find out how Character 12 is drawn. In the next program the address of the *LGL* instructions for drawing the plus sign will live in the shape table at Location 2. (See Figure 3.)

The new routines required for PROG2 are ADDCHL, SHPADR, ANTISH, NEWLOC and PUTLOC. See the subroutine summaries for more information about what these routines do and what resources they use.

In PROG2 we used the C-list even though we were keeping track of only one character. With the framework we've already built, it is simple to add more characters — in fact, it requires only three lines!

```
00412 LDD #128    Vector for
                  ''down''
00414 STD VOUT
00416 JSR ADDCHL  Add another
                  character
                  to the list.
```

The plus signs are interesting, but you may have already noticed a serious shortcoming: They are oblivious to one another. What good is a game if the players don't interact? Furthermore, they are blind to their surroundings. If we drew a brick wall on the screen, they'd pass right through it! At the very least we want them to bump into each other. We might also want them to explode or wiggle a little.

How do we detect that we have

MODIFIES: CC,D,Y and the C-list.
OUTPUTS: none

This routine is for adding a character to the C-list. It steps through, looking for the first empty slot. If there are no empty slots nothing is added. SHAPE, usually set by the programmer, identifies the character by number. SCRLOC, set by program or programmer, is the screen location where the character is to appear initially. The use and value of AUX is defined on a character-by-character basis. VLOC and VBIT are created by a call to VRAMCO. VRAMCO must be called after setting SCRLOC and before calling ADDCHL. VOUT is the vector the character will have initially. It is set by the programmer or by RNDVEC or DIRVEC.

After ADDCHL has placed these values in the C-list, they can be retrieved by referring to offsets from the X register. This table shows how the variables read by ADDCHL are associated with the C-list:

SHAPE —
XSHAPE,X shape or character number
SCRLOC —
XSCLOC,X screen location or pixel number
AUX —
XAUX,X user defined
VLOC —
XVLOC,X video RAM location
VBIT —
XVBIT,X video RAM pixel offset
VOUT —
XVECT,X vector

SHPADR —INPUTS: A
MODIFIES: CC,Y,D
OUTPUTS: STSH

Takes the value in the A register as an offset into the shape table. The value of A must be even, and there must be a shape table entry corresponding to A. The output STSH is set to the address retrieved from the shape table. WRTSHP, ANTISH and OKMOV use STSH for drawing, erasing and checking for occurrences of other objects on the screen.

ANTISH —INPUTS: STSH, C-list values XVLOC,X and XVBIT,X
MODIFIES: CC,D,Y, video RAM, TLOC, TBIT
OUTPUTS: none

Erases a character from the screen. As a general rule, characters must always be erased before they are moved. When this routine is called, the X register must point into the C-list to the character you want to erase. STSH must have been set already with a call to SHPADR. The values XVLOC,X bumped into something? Recall our algorithm for moving the plus signs:

1) Erase the old plus sign from screen
2) Calculate the new location for the plus sign by adding the vector to the old location
3) Write plus sign at the new location
4) Store the new location into the C-list

I propose we add some new operations between steps 2 and 3. Instead of immediately drawing the character at the new location, what if we first check the pixels where the shape is about to be written to see if anything is there already? If there is, we can skip this character and continue on to the next C-list entry. We might also want to generate a new — probably random — vector for the character, so that next time it heads in a different direction. Now we:

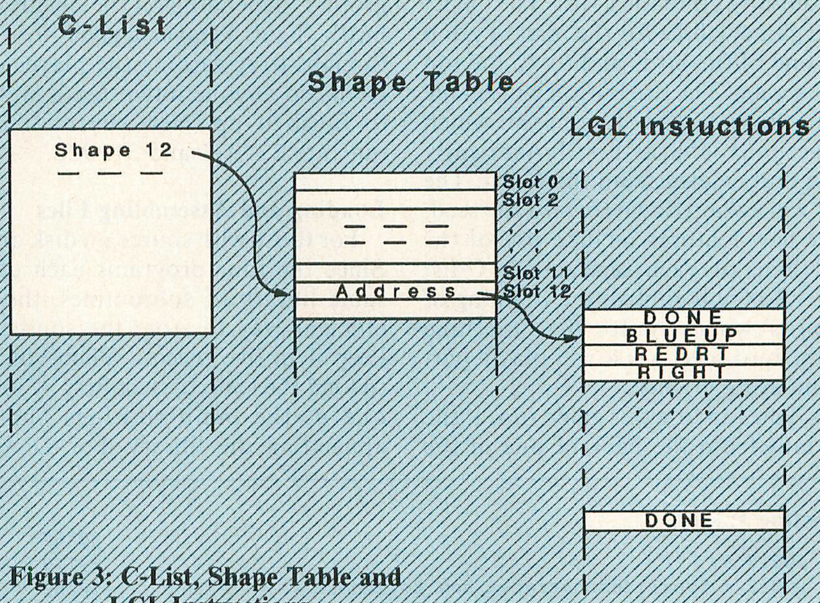


Figure 3: C-List, Shape Table and LGL Instructions

1) Erase the old plus sign from screen.
2) Calculate the new location for the plus sign by adding the vector to the old location.
2a) Check the new location to see if it's already occupied.
2b) If not occupied go to 3.
2c) Generate a random vector.
2d) Get the old location from the C-list.
2e) Redraw the character where it was before.
2f) Go to 5.
3) Write plus sign at the new location.
4) Store the new location into the C-list.
5) Continue stepping through C-list.

The program shown in Listing 3 illustrates these steps. It completely fills the C-list with swirling little white dots. The new routines we'll be using are OKMOV, RNDVEC and GETLOC.

Here are some interesting variations to PROG3:

1) Put up obstructions. First define a barrier shape with *LGL* instructions (maybe bricks?), and place them about the screen the same way we drew the "static" plus sign in PROG1.

2) Fill the C-list with an assortment of objects. (Notice that if the shapes are too complex, they'll slow down the program, in which case you might want to half-fill the C-list.)

3) Multiply some of the vectors by two. (Shift the D register to the left.)

The next program makes full use of the subroutine library. First we'll draw a mountain range. Then we'll place one

and XVBIT,X are automatically retrieved.

NEWLOC — INPUTS: C-list values XSCLOC,X and XVECT,X
MODIFIES: CC,D
OUTPUTS: VLOC, VBIT, SCRLOC
Calculates new screen location and video RAM address for the C-list character currently pointed to by the X register by adding the character's vector to its old location.

PUTLOC — INPUTS: VLOC, VBIT, SCRLOC
MODIFIES: CC,D
OUTPUTS: C-list values XVLOC,X, XVBIT,X, XSCLOC,X
Stores screen location and video RAM address values into C-list entry pointed to X register. Usually done to update C-list after calling NEWLOC and successfully moving a character.

OKMOV — INPUTS: STSH, VLOC, VBIT
MODIFIES: CC,D,Y, TBIT, TLOC
OUTPUTS: the Z flag in the condition code.
Traces out the *LGL* shape instructions whose address appears in STSH at the location given by VLOC and VBIT. If no pixels are found to be set (i.e. there is nothing there already) the Z flag is set, otherwise cleared. (If the Z flag is set, tests for zero will be true; for instance, a Branch On Equal (BEQ) instruction will branch.)

RNDVEC — INPUTS: none
MODIFIES: CC,D, RND1, TVEC
OUTPUTS: VOUT
Generates a random vector with a maximum displacement of one pixel in any direction.

GETLOC — INPUTS: none
MODIFIES: CC,D
OUTPUTS: VBIT, VLOC
Retrieves video RAM address where a character is drawn from the C-list. Usually called just after OKMOV has failed and before WRTSHP is called to restore the character to the screen.

BSTATE — INPUTS: none
MODIFIES: CC,A
OUTPUTS: BUTTON
Checks to see if the fire button is pushed. Sets BUTTON if it is, clears it otherwise.

DIRVEC — INPUTS: TARGET, C-list XSCLOC,X
MODIFIES: CC,D, TVEC
OUTPUTS: VOUT
Generates a vector toward the screen location that has been previously stored in TARGET. This is the routine used to guide the birds to the birdseed.

little man (controlled by the joystick) and four birds into the C-list. The object of the game will be for the man to jump onto one of the birds and fly to the top of the screen. The fire button will enable you to throw grains of bird seed, which are actually characters dynamically added and deleted from the C-list. The birds will swoop down toward the seed. Other new features include use of the `XAUX` byte of each character's C-list entry. `XAUX` will control the flapping of the birds' wings. As for the little man and the bird seed, `XAUX` will play a part in simulating gravity.

Yes, you can lose this game too! If the man falls from the back of one of the birds, he can perish upon hitting the ground, depending on the height of the bird's flight. I haven't given too much thought to rewarding the player of the game, so anyone interested is welcome to finish it up. New subroutines this time are `BSTATE` and `DIRVEC`.

Loading and Assembling Files

For those with source on disk or tape: Since the four programs each use the same library of subroutines, the most efficient way to store the source is to keep it in five pieces. When you want to load the source, start first by loading one of the main routines and then appending the library. For *Disk EDTASM* users this is done with the `LDA` command. For those using the *EDTASM+* ROM pack, two loads with the L command will append files automatically.

Disk EDTASM users will find that the first three programs can be assembled in memory with the /AO/IM switches if `EDTASMOV` is used. The fourth must be assembled to disk. ROM pack users can assemble any of the four programs directly in memory.

(Questions or comments concerning this tutorial may be directed to the author at 84 Round Hill Road, Wethersfield, CT 06109. Please enclose an SASE when requesting a reply.) ☐

Listing 1: `PROG1`

```
00010 *
00012 * Prog1 demonstrates how to choose
00014 * a screen address and draw a
00016 * shape.
00018 *
00100 DPVAL    EQU    $67          Using D.P. for speed
00110 STACK    EQU    DPVAL*256-1
00120          SETDP  DPVAL
00130          ORG    DPVAL*256+256
00140 START    LDA    #DPVAL
00150          TFR    A,DP         Set D.P. register
00160          LDS    #STACK       Move stack
00170          JSR    VIDEO        Init vid params
00180 *
00190 * CHOSE WHERE TO DRAW
00200 *
00210          LDD    #6200        Center of screen
00220          STD    SCRLOC       Store for VRAMCO
00230          JSR    VRAMCO       Create ram addr
00240          LDD    #PLSSGN      Get addr of +
00250          STD    STSH         Store for WRTSHP
00260          JSR    WRTSHP       Write the shape
00270 LOOP     BRA    LOOP         busy loop
00280 *
00290 * END OF MAN PROGRAM
00300 *
00302 * START OF SHAPE TABLE
00304 *
00306 SHTBL    FDB    0
00308 *
00310 * START OF SHAPE DEFS
00320 *
00330 PLSSGN   FCB    BLUEUP
00340          FCB    BLUEUP
00350          FCB    BLUEDL
00360          FCB    BLUERT
00370          FCB    RIGHT
00380          FCB    BLUE
00390          FCB    DONE
00400 *
00410 * END OF CUSTOM CODE.
00420 * THE REST OF THIS STAYS
00430 * THE SAME.
```

Listing 2: `PROG2`

```
00100 *
00110 * Prog2 demonstrates animation
00120 * and use of the c-list for tracking
00130 * animated characters.
00140 *
00150 DPVAL    EQU    $67
00160 STACK    EQU    DPVAL*256-1
00170          SETDP  DPVAL
00180          ORG    DPVAL*256+256
00190 START    LDA    #DPVAL
00200          TFR    A,DP
00210          LDS    #STACK
00220          JSR    VIDEO
00230 *
00240 * Going to add just one character
00250 * to the c-list. First set up params
00260 * for call to ADDCHL.
00270 *
00280          LDD    #6200        Center of screen
00290          STD    SCRLOC       Store for VRAMCO
00300          JSR    VRAMCO       generate ram adr
00310          LDA    #PLUS        character # for +
00320          STA    SHAPE        store for addchl
00330 *
00340 * the value "130" is the vector we
00350 * chose to make the character move
00360 * right 2 pixels and down one in
00370 * each pass through the c-list.
00380 *
00390          LDD    #130
00400          STD    VOUT         Vector for addchl
00410          JSR    ADDCHL       Add to c-list
00420 *
00430 LOOP     LDX    #IXSTRT      Point to c-list
00440 CONT1    LEAX   XNEXT,X      Pt. next slot
00450          CMPX   #CLEND       End of clist?
00460          BHS    LOOP
00470 *
00480 * Stepping through c-list now.
00482 * We KNOW that there is only 1
00484 * entry being used in the c-list
00486 * but I wanted to show you how to
00488 * set up the loop anyway.
00490 * Get character's shape number.
00500 *
00510          LDA    XSHAPE,X
00520          BEQ    CONT1        Skip empties
00530          CMPA   #PLUS
00540          BNE    CONT1        Skip if not +
00550 *
00560          JSR    SHPADR       Get +'s shape
00570          JSR    ANTISH       Erase +
00580          JSR    NEWLOC       Add vctr to loc
00590          JSR    WRTSHP       Draw at new loc.
00600          JSR    PUTLOC       Put in c-list
00610          BRA    CONT1
00620 *
```

```
00630 * END OF MAN PROGRAM
00640 *
00650 * START OF SHAPE TABLE
00652 * Note how the shape number for
00654 * "plus" has been symbolicly
00656 * defined.
00660 *
00670 SHTBL   FDB     0
00680 PLUS    EQU     *-SHTBL
00690         FDB     PLSSGN
00700 *
00710 * START OF SHAPE DEFS
00720 *
00730 PLSSGN  FCB     BLUEUP
00740         FCB     BLUEUP
00750         FCB     BLUEDL
00760         FCB     BLUERT
00770         FCB     RIGHT
00780         FCB     BLUE
00790         FCB     DONE
00800 *
00810 * END OF CUSTOM CODE.
00820 * THE REST OF THIS STAYS
00830 * THE SAME.
```

Listing 3: PROG3

```
00100 *
00110 * Prog3 demonstrates how to make
00120 * objects on the screen interact
00130 * with one another.
00150 *
00160 DPVAL   EQU     $67
00170 STACK   EQU     DPVAL*256-1
00180         SETDP   DPVAL
00190         ORG     DPVAL*256+256
00200 START   LDA     #DPVAL
00210         TFR     A,DP
00220         LDS     #STACK
00230         JSR     VIDEO
00240         LDA     #DOT      Dot's shape #
00250         STA     SHAPE     For ADDCHL
00260 LOOP1   LDD     #6200     Screen center
00270         STD     SCRLOC    For VRAMCO
00280         JSR     VRAMCO    Gen ram loc
00290         JSR     RNDVEC    Random vectr
00300         JSR     ADDCHL    add to c-list
00310 *
00320 * Note we are continually trying
00330 * to add new characters to the
00340 * c-list even though it'll be
00350 * stuffed full after the 1st 100.
00360 *
00370 CONT1   LDX     #IXSTRT pt to c-list
00380 LOOP2   LEAX    XNEXT,X pt next slot
00390         CMPX    #CLEND  end of clist?
00400         BHS     LOOP1
00410 *
00420 * Step through c-list
00430 *
00440         LDA     XSHAPE,X
00450         BEQ     LOOP2     Skip empties
00460 *
00470 * All characters will be handled the
00480 * same. You could fill the c-list with
00490 * any combination of dots, dashes,
00492 * or whatever...
00494 *
00500         JSR     SHPADR
00510         JSR     ANTISH    erase char
00520         JSR     NEWLOC    Gen new loc
00530         JSR     OKMOV     Ok to move?
00540         BEQ     ITSOK
00550 *
00560 * If something is already at the
00570 * place on the screen where we
00580 * want to go then pick a new
00590 * vector for next time and give up.
00600 *
00610         JSR     RNDVEC    random vctr
00620         LDD     VOUT      get result
00630         STD     XVECT,X put in c-list
00640         JSR     GETLOC    get old loc
00650         JSR     WRTSHP    redraw there
00660         BRA     LOOP2     Go do next
00670 *
00680 * If it was ok to move to the new
00690 * location then do it.
00700 *
00710 ITSOK   JSR     WRTSHP    Draw at new
00720         JSR     PUTLOC    update c-list
00730         BRA     LOOP2
00740 *
00750 * END OF MAIN PROGRAM
00760 *
00770 * START OF SHAPE TABLE
00780 *
00790 SHTBL   FDB     0
00800 DOT     EQU     *-SHTBL
00810         FDB     WHTDOT
00820 *
00830 * START OF SHAPE DEFS
00840 *
00850 WHTDOT  FCB     WHITE
00860         FCB     DONE
00870 *
00880 * END OF CUSTOM CODE.
00890 * THE REST OF THIS STAYS
00900 * THE SAME.
```

Listing 4: PROG4

```
00100 *
00110 * Prog4 demostrates full use of
00120 * the subroutine library.
00130 * The object of the game is to fly
00140 * to the top of the screen on the
00150 * back of one of the birds. If
00160 * you fall you may die. The joystick
00170 * fire button will cause you to
00180 * throw bird seed. This attracts
00190 * the birds so you can jump on
00200 * them.
00210 * - Kevin Dowd
00220 DPVAL   EQU     $67
00230 STACK   EQU     DPVAL*256-1
00240         SETDP   DPVAL
00250         ORG     DPVAL*256+256
00260 START   LDA     #DPVAL
00270         TFR     A,DP
00280         LDS     #STACK
00290         JSR     VIDEO
00300 *
00310 * A mountain range will be created
00320 * by repeatedly drawing the shape
00330 * "MOUNTN" at the locations in the
00340 * list "MTLIST".
00350 *
00360         LDD     #MOUNTN
00370         STD     STSH
00380         LDX     #MTLIST
```

```
00390 LOOP1   LDD     ,X++
00400         BLT     CONT1
00410         STD     SCRLOC
00420         JSR     VRAMCO
00430         JSR     WRTSHP
00440         BRA     LOOP1
00450 *
00460 * Now we will add the players to
00470 * the c-list, 1 man and 4 birds.
00480 *
00490 CONT1   LDD     #6300
00500         STD     SCRLOC
00510         JSR     VRAMCO
00520 * ADD MAN
00530         CLR     AUX
00540         LDA     #MAN
00550         STA     SHAPE
00560         CLR     VOUT
00570         CLR     VOU2
00580         CLR     TMP3
00590         JSR     ADDCHL
00600 * ADD BIRDS
00610         LDA     #BIRD
00620         STA     SHAPE
00630         LDD     #6300
00640         STD     SCRLOC
00650         JSR     VRAMCO
00660         JSR     RNDVEC
00670         LDA     #04
00680         STA     AUX
00690         STA     TMP2
00700 LOOP3   DEC     TMP2
00710         BLT     LOOP2
00720         JSR     ADDCHL
00730         BRA     LOOP3
00740 *
00750 * This is the start of the main
00760 * loop. We'll check the joystick
00770 * and fire buttons. From the joy-
00780 * stic we'll make up a vector for
00790 * the little man to run along
00800 * the mountains.
00810 *
00820 LOOP2   JSR     [$A00A] chk joystk
00830         JSR     BSTATE  chk button
00840         LDX     #IXSTRT pt c-list
00850         TST     BUTTON  button set?
00860         BEQ     CONT2
00870 * If button was pushed will add
00880 * a grain of bird seed to the
00890 * clist.
00900 *
00910         LDA     #SEED
00920         STA     SHAPE
00930 *
00940 * The vector for the bird seed will
00950 * come from RNDVEC. Then we'll add
00960 * an upward displacement so
00970 * it'll be as if the man threw it
00980 * over his head.
00990 *
01000         JSR     RNDVEC
01010         LDD     VOUT
01020         ADDD    #$FF80
01030         STD     VOUT
01040 *
01050 * CH1LOC is a kludge. It's the
01060 * address of the screen loc of the
01070 * first character in the c-list
01080 * (in this case, the little man).
01090 * Bird seed will start just
01100 * above the man's head.
01110 *
01120         LDD     CH1LOC
01130         ADDD    #$FF80
01140         STD     SCRLOC
```

```
01150         JSR     VRAMCO
01160         CLR     AUX
01170         JSR     ADDCHL  add seed
01180 CONT2   LEAX    XNEXT,X
01190         CMPX    #CLEND  end c-list?
01200         BHS     LOOP2
01210         LDA     XSHAPE,X
01220         BEQ     CONT2   skip empties
01230         CMPA    #MAN
01240         LBGT    CONT3
01250 *
01260 * The man is constantly running.
01270 * This is a function of the
01280 * value in tmp3.
01290 * The old and new shape number
01300 * being used to draw the man is
01310 * calculate from it.
01320 *
01330         LDA     TMP3
01340         ANDA    #01
01350         LSLA
01360         ADDA    XSHAPE,X
01370         JSR     SHPADR
01380         JSR     ANTISH
01390 *
01400 * Man erased, get joystk.
01410 * Will generate a vector for the
01420 * man based on the pot values.
01430 *
01440         CLR     VOUT
01450         CLR     VOU2
01460         LDA     $15B
01470         CMPA    #$0C
01480         BGT     J01
01490         LDD     #$FF80
01500         STD     VOUT
01510         BRA     J02
01520 J01     CMPA    #33
01530         BLT     J02
01540         LDD     #$80
01550         STD     VOUT
01560 J02     LDA     $15A
01570         CMPA    #$0C
01580         BGT     J03
01590         LDD     VOUT
01600         SUBD    #01
01610         STD     VOUT
01620         BRA     J04
01630 J03     CMPA    #33
01640         BLT     J04
01650         LDD     VOUT
01660         ADDD    #01
01670         STD     VOUT
01680 *
01690 * Next will use okmov to test to
01700 * see if the man could fall.
01710 * If he can will increase the
01720 * value in X,AUX, a counter to
01730 * tell how long his feet have
01731 * been off the ground. From this
01732 * we'll generate a number by
01733 * which we can bias his vector
01734 * and simulate gravity.
01735 *
01750 J04     LDD     #$80
01760         STD     XVECT,X
01770         JSR     NEWLOC
01780         JSR     OKMOV   Can he fall?
01790         BEQ     CONT4
01800 *
01810 * Man can fall,  so he will.
01820 *
01830         CLR     XAUX,X
01840         CLRA
01850         CLRB
01851 *
```

```
01852 * GRVVEC will generate a gravity
01853 * vector based on the value of
01854 * X,AUX. If the man had his feet
01855 * on something then we have just
01856 * reset X,AUX and GRVVEC will
01857 * return a gravity bias of 0.
01858 *
01860 CONT4   JSR     GRVVEC
01870           ADDD    VOUT
01880           STD     XVECT,X
01890           JSR     NEWLOC
01900           JSR     OKMOV
01910           BEQ     CONT6
01920 *
01930 * Killed by a fall? If the man
01931 * had been able to move then
01932 * we wouldn't be here.
01933 *
01950           LDA     XAUX,X
01960           CMPA    #25
01970           LBGT    YOUDIE
01980 *
01990 * It could that he wasn't fall-
01991 * all that long, so we'll just
01992 * make him bounce a little by
01993 * generating a new vector for
01994 * him.
02000 *
02010           LDD     #0
02020           STD     GRAVTY
02030           CLR     XAUX,X
02040           JSR     RNDVEC
02050           LDD     VOUT
02060           STD     XVECT,X
02070           JSR     NEWLOC
02080           JSR     OKMOV
02090           BEQ     CONT6
02100 *
02110 * Give up if couldn't move him.
02120 *
02130           JSR     GETLOC
02140           JSR     WRTSHP
02150           LBRA    CONT2
02160 *
02161 * We were able to move the little
02162 * man by some path. Check his
02163 * screen location to see if we
02164 * won the game yet.
02165 *
02170 CONT6   LDD     SCRLOC
02180           CMPD    #$280
02190           LBLE    YOUWIN
02200 *
02210           INC     TMP3
02220           LDA     TMP3
02230           ANDA    #01
02240           LSLA
02250           ADDA    XSHAPE,X
02260           JSR     SHPADR
02270           JSR     WRTSHP
02280           JSR     PUTLOC
02281 *
02282 * Now for the birds.
02283 *
02290 CONT3   CMPA    #BIRD
02300           LBNE    CONT8
02301 *
02302 * The birds flap their wings
02303 * based on the value of X,AUX.
02304 *
02340           LDA     XAUX,X
02350           ANDA    #02
02360           ADDA    XSHAPE,X
02370           JSR     SHPADR
02380           JSR     ANTISH
02390           LDA     XAUX,X
02400           BEQ     BD4
02410           DECA
02420           ANDA    #02
02430 BD4       ADDA    XSHAPE,X
02440           JSR     SHPADR
02450           TST     BUTTON  Pushed?
02460           BEQ     BD1
02461 *
02462 * If the fire button was pushed
02463 * then the bird will head for
02464 * the last grain of bird seed
02465 * thrown. DIRVEC generates a
02466 * vector towards the screen loc
02467 * stored in TARGET.
02468 *
02470           JSR     DIRVEC
02480           LDD     VOUT
02490           STD     XVECT,X
02500 BD1       JSR     NEWLOC
02510           JSR     OKMOV
02520           BEQ     BD2
02521 *
02522 * If the bird bumps into some-
02523 * thing we'll not only generate
02524 * a new vector for it, we'll
02525 * also modify X,AUX so the wings
02526 * flap for a while.
02527 *
02530           JSR     RNDVEC
02540           LDD     VOUT
02550           STD     XVECT,X
02560           JSR     NEWLOC
02570           JSR     OKMOV
02580           BEQ     BD3
02590           JSR     GETLOC
02600           LDA     XAUX,X
02610           ANDA    #02
02620           ADDA    XSHAPE,X
02630           JSR     SHPADR
02640           JSR     WRTSHP
02650           LBRA    CONT2
02660 BD3       LDA     XAUX,X
02670           BEQ     BD5
02680           ORA     #32
02690           STA     XAUX,X  Flap
02700           BRA     BD2
02710 BD5       LDA     #33
02720           STA     XAUX,X
02730 BD2       JSR     WRTSHP
02740           JSR     PUTLOC
02750           LDA     XAUX,X
02760           LBEQ    CONT2
02770           DEC     XAUX,X
02780           LBRA    CONT2
02790 *
02800 * Bird seed
02810 *
02820 CONT8     CMPA    #SEED
02830           LBNE    CONT2
02840           LDA     XAUX,X
02850           ANDA    #01
02860           LSLA
02870           ADDA    XSHAPE,X
02880           JSR     SHPADR
02890           JSR     ANTISH
02891 * bird seed is also subject to
02892 * gravity. Whenever a grain of
02893 * bird seed bumps into something
02894 * it will be deleted from the
02895 * c-list
02896 *
02900           LDD     XVECT,X
02910           PSHS    D
02920           JSR     GRVVEC
02930           ADDD    XVECT,X
02940           STD     XVECT,X
```

```
02950         LDA     XAUX,X
02960         ANDA    #01
02970         LSLA
02980         ADDA    XSHAPE,X
02990         JSR     SHPADR
03000         JSR     NEWLOC
03010         JSR     OKMOV
03020         BEQ     SD1
03030         PULS    D
03040         CLR     XSHAPE,X
03050         LBRA    CONT2
03060 SD1     JSR     WRTSHP
03070         JSR     PUTLOC
03080         PULS    D
03090         STD     XVECT,X
03100         LDD     XSCLOC,X
03110         STD     TARGET
03120         LBRA    CONT2
03130 YOUDIE  NOP
03140 YOUWIN  JSR     BSTATE
03150         LDA     #200
03160         STA     65314
03170         TST     BUTTON
03180         BEQ     YOUWIN
03190         LBRA    START
03191 *
03192 * GRRVEC is a helper function
03193 * for this program only. It
03194 * generates a number based on
03195 * X,AUX which, when added to a
03196 * character's vector will sim-
03197 * ulate gravity.
03198 *
03200 GRVVEC  LDA     XAUX,X
03210         CMPA    #100
03220         BGT     G03
03230         INC     XAUX,X
03240         CMPA    #03
03250         BGT     G01
03260         LDD     #0
03270         BRA     G04
03280 G01     CMPA    #05
03290         BGT     G02
03300         LDD     #$80
03310         BRA     G04
03320 G02     CMPA    #07
03330         BGT     G03
03340         LDD     #$100
03350         BRA     G04
03360 G03     LDD     #$180
03370 G04     RTS
03380 *
03390 * END OF MAIN PROGRAM
03400 *
03410 * START OF SHAPE TABLE
03420 *
03430 SHTBL   FDB     0
03440 MAN     EQU     *-SHTBL
03450         FDB     MAN1
03460         FDB     MAN2
03470 BIRD    EQU     *-SHTBL
03480         FDB     BIRD2
03490         FDB     BIRD1
03500 SEED    EQU     *-SHTBL
03510         FDB     SEED1
03520         FDB     SEED2
03530 *
03540 * START OF SHAPE DEFS
03550 *
03560 MOUNTN  FCB     WHTRT
03570         FCB     BLUERT
03580         FCB     BLUERT
03590         FCB     BLUERT
03600         FCB     BLUERT
03610         FCB     BLUERT
```

```
03620         FCB     BLUERT
03630         FCB     BLUERT
03640         FCB     BLUERT
03650         FCB     BLUERT
03660         FCB     BLUERT
03670         FCB     BLUERT
03680         FCB     BLUERT
03690         FCB     BLUERT
03700         FCB     WHTUL
03710         FCB     WHTLF
03720         FCB     BLUELF
03730         FCB     BLUELF
03740         FCB     BLUELF
03750         FCB     BLUELF
03760         FCB     BLUELF
03770         FCB     BLUELF
03780         FCB     BLUELF
03790         FCB     BLUELF
03800         FCB     BLUELF
03810         FCB     BLUELF
03820         FCB     BLUELF
03830         FCB     WHTUR
03840         FCB     WHTRT
03850         FCB     BLUERT
03860         FCB     BLUERT
03870         FCB     BLUERT
03880         FCB     BLUERT
03890         FCB     BLUERT
03900         FCB     BLUERT
03910         FCB     BLUERT
03920         FCB     BLUERT
03930         FCB     BLUERT
03940         FCB     WHTUL
03950         FCB     WHTLF
03960         FCB     BLUELF
03970         FCB     BLUELF
03980         FCB     BLUELF
03990         FCB     BLUELF
04000         FCB     BLUELF
04010         FCB     BLUELF
04020         FCB     BLUELF
04030         FCB     WHTUR
04040         FCB     WHTRT
04050         FCB     BLUERT
04060         FCB     BLUERT
04070         FCB     BLUERT
04080         FCB     BLUERT
04090         FCB     BLUERT
04100         FCB     WHTUL
04110         FCB     WHTLF
04120         FCB     BLUELF
04130         FCB     BLUELF
04140         FCB     BLUELF
04150         FCB     WHTUR
04160         FCB     WHTRT
04170         FCB     BLUERT
04180         FCB     WHTUL
04190         FCB     WHITE
04200         FCB     DONE
04210 *
04211 * This is a list of screen
04212 * locations where mountains
04213 * are drawn.
04214 *
04220 MTLIST  FDB     12180
04230         FDB     11164
04240         FDB     11672
04250         FDB     12188
04260         FDB     11676
04270         FDB     11809
04280         FDB     12199
04290         FDB     12210
04300         FDB     11194
04310         FDB     11702
04320         FDB     12218
```

```
04330         FDB     11706
04340         FDB     11840
04350         FDB     12227
04360         FDB     12236
04370         FDB     12242
04380         FDB     11861
04390         FDB     12248
04400         FDB     12253
04410         FDB     12257
04420         FDB     11750
04430         FDB     12265
04440         FDB     12276
04450         FDB     10559
04460         FDB     10946
04470         FDB     11462
04480         FDB     12176
04490         FDB     12166
04500         FDB     11779
04510         FDB     12160
04520         FDB     $FFFF
04530 MAN1    FCB     WHTDN
04540         FCB     BLUELF
04550         FCB     REDDR
04560         FCB     BLUEDL
04570         FCB     REDRT
04580         FCB     BLKRT
04590         FCB     REDUP
04600         FCB     UP
04610         FCB     RED
04620         FCB     DONE
04630 MAN2    FCB     WHTDN
04640         FCB     BLUELF
04650         FCB     BLKDR
04660         FCB     REDDL
04670         FCB     BLKRT
04680         FCB     REDRT
04690         FCB     BLKUP
04700         FCB     UP
04710         FCB     BLACK
04720         FCB     DONE
04730 BIRD1   FCB     WHTUL
04740         FCB     LEFT
04750         FCB     LEFT
04760         FCB     LEFT
04770         FCB     WHTDR
04780         FCB     WHTDR
04790         FCB     REDRT
04800         FCB     REDRT
04810         FCB     RIGHT
04820         FCB     REDRT
04830         FCB     REDUR
04840         FCB     WHTUR
04850         FCB     WHITE
04860         FCB     DONE
04870 BIRD2   FCB     WHTDL
04880         FCB     LEFT
04890         FCB     LEFT
04900         FCB     LEFT
04910         FCB     WHTRT
04920         FCB     WHTRT
04930         FCB     REDRT
04940         FCB     REDRT
04950         FCB     RIGHT
04960         FCB     REDRT
04970         FCB     REDRT
04980         FCB     WHTRT
04990         FCB     WHTRT
05000         FCB     DONE
05010 SEED1   FCB     RED
05020         FCB     DONE
05030 SEED2   FCB     BLUE
05040         FCB     DONE
05050 * END OF CUSTOM CODE
05060 * THE REST OF THIS STAYS
05070 * THE SAME.
```

Listing 5:

```
06000 VIDEO    EQU     *
06010 *
06020 * THIS ROUTINE HAS REALLY
06030 * HARD PARAMETRS.
06040 *
06050 SCREEN   EQU     29696
06060 SCREND   EQU     32767
06070          STA     65478
06080          STA     65481
06090          STA     65482
06100          STA     65485
06110          STA     65487
06120          STA     65489
06130          STA     65472
06140          STA     65474
06150          STA     65477
06160          LDA     #255
06170          STA     65314
06180 * CLEAR SREEN AND CLIST
06190          LDX     #SCREEN
06200 XX1      CMPX    #SCREND
06210          BHI     XX2
06220          CLR     ,X+
06230          BRA     XX1
06240 XX2      LDX     #CLIST
06250 XX3      CMPX    #CLEND
06260          BGT     XX4
06270          CLR     ,X+
06280          BRA     XX3
06290 XX4      RTS
06300 ADDCHL   LDY     #IXSTRT
06310 C90      LEAY    XNEXT,Y
06320          CMPY    #CLEND
06330          BGE     C91
06340          TST     XSHAPE,Y
06350          BNE     C90
06360          LDA     SHAPE
06370          STA     XSHAPE,Y
06380          LDD     SCRLOC
06390          STD     XSCLOC,Y
06400          LDA     AUX
06410          STA     XAUX,Y
06420          LDD     VLOC
06430          STD     XVLOC,Y
06440          LDA     VBIT
06450          STA     XVBIT,Y
06460          LDD     VOUT
06470          STD     XVECT,Y
06480 C91      RTS
06490 *
06500 GETLOC   LDA     XVBIT,X
06510          STA     VBIT
06520          LDD     XVLOC,X
06530          STD     VLOC
06540          RTS
06550 PUTLOC   LDA     VBIT
06560          STA     XVBIT,X
06570          LDD     VLOC
06580          STD     XVLOC,X
06590          LDD     SCRLOC
06600          STD     XSCLOC,X
06610          RTS
06620 VRAMCO   LDB     SCRLO2
06630          ANDB    #03
06640          STB     VBIT
06650          LDD     SCRLOC
06660          LSRB
06670          LSRA
06680          BCC     CC1
06690          ADDB    #$80
06700 CC1      LSRB
06710          LSRA
06720          BCC     CC2
06730          ADDB    #$80
06740 CC2      ADDD    #SCREEN
06750          STD     VLOC
06760          RTS
06770 *
06780 NXTSET   LDA     #$20
06790          ANDA    ,Y
06800          BEQ     C07
06810          DEC     TBIT
06820          BGE     C10
06830          LDA     #03
06840          STA     TBIT
06850          LDD     TLOC
06860          SUBD    #01
06870          STD     TLOC
06880          BRA     C10
06890 C07      LDA     #$10
06900          ANDA    ,Y
06910          BEQ     C10
06920          INC     TBIT
06930          LDA     #04
06940          ANDA    TBIT
06950          BEQ     C10
06960          CLR     TBIT
06970          LDD     TLOC
06980          ADDD    #01
06990          STD     TLOC
07000 C10      LDA     #$08
07010          ANDA    ,Y
07020          BEQ     C11
07030          LDD     TLOC
07040          SUBD    #32
07050          CMPD    #SCREEN
07060          BGE     C14
07070          ADDD    #3072
07080          BRA     C14
07090 C11      LDA     #$04
07100          ANDA    ,Y
07110          BEQ     C09
07120          LDD     TLOC
07130          ADDD    #32
07140          CMPD    #SCREND
07150          BLE     C14
07160          SUBD    #3072
07170 C14      STD     TLOC
07180 C09      LEAY    1,Y
07190          RTS
07200 *
07210 NEWLOC   LDD     XSCLOC,X
07220          ADDD    XVECT,X
07230          BGE     C15
07240          ADDD    #12288
07250          BRA     C16
07260 C15      CMPD    #12287
07270          BLE     C16
07280          SUBD    #12288
07290 C16      STD     SCRLOC
07300          JSR     VRAMCO
07310          RTS
07320 *
07330 WRTSHP   LDD     VLOC
07340          STD     TLOC
07350          LDA     VBIT
07360          STA     TBIT
07370          LDY     STSH
07380 C22      LDA     ,Y
07390          BGE     C23
07400          RTS
07410 C23      TFR     A,B
07420          ANDA    #$40
07430          BEQ     C24
07440          ANDB    #03
07450          LDA     #03
07460          SUBA    TBIT
07470          STA     TMP2
```

PERRY COMPUTERS

The Ideal Buy

1-800-248-3823

TANDY COMPUTERS

Tandy 1000-HX 256K 1 Drive	535.00
Tandy 1000-TX 640K 1 Drive	860.00
Tandy 3000-HL 512K 1 Drive	1090.00
Tandy 3000 640K 1 Drive	1475.00
Tandy 4000 1 Meg 1 Drive	1890.00
Tandy 5000MC 2 Meg 1 Drive	4250.00
Tandy 5000MC 2 Meg 40 Meg	5525.00
Tandy 5000MC 2 Meg 84 Meg	5950.00
Tandy 1400LT 768K 2 Drives	1195.00
Tandy 102 24K	375.00
Tandy Color 3 128K	155.00

MONITORS & BOARDS

VM-4 Monochrome Green	95.00
VM-5 Monochrome Green	115.00
CM-5 Color RGB	220.00
CM-11 Color RGB	335.00
EGM-1 Color RGB (EGA)	510.00
VGM-100 Monochrome Analog	169.00
VGM-200 Color Analog	425.00
VGM-300 Color Analog	535.00
Tandy Dual Display Card	145.00
Tandy EGA Card	185.00
Paradise Basic EGA Card	135.00
Zucker Mono Graphics Card	72.00

DRIVES

Color Computer Drive 0	225.00
5 1/4" External Drive 1000EX	180.00
3 1/2" External Drive 1000EX	200.00
Tandy 20 Meg Hardcard	509.00
Tandy 40 Meg Hardcard	679.00
Zucker 30 Meg Hardcard	435.00
Seagate 20 Meg Hard Drive	265.00
Tandy 1000/SX/TX Controller	80.00

ZUCKER BOARDS

Zucker Serial Board	45.00
Zucker 0K Memory Board 1000	47.00
Zucker MFB 0K for 1000	106.00
Zucker 1200 Baud Modem Card	72.00

PRINTERS

DMP-106 Dot-Matrix	165.00
DMP-130 Dot-Matrix	255.00
DWP-230 Daisy Wheel	349.00
Epson LX-800 Dot-Matrix	205.00
Epson FX-86E Dot-Matrix	375.00
Epson FX-286E Dot-Matrix	475.00
Epson LQ-500 Dot-Matrix	375.00
Epson LQ-850 Dot-Matrix	579.00

Please write for complete price list.
We carry more items than listed here.

All prices and offers may be changed or withdrawn without notice. Advertised prices are cash prices. C.O.D. accepted add 2% (minimum charge $10.00). M.C., Visa add 2%. All non defective items require return merchandise authorization. Call for RMA Number before returning. Delivery is subject to product availability. Add 1½% for shipping and handling, $5.00 minimum charge.

TM - Registered Trademark of Tandy, Epson, and IBM

Monday thru Friday 9am - 5pm EST.

PERRY COMPUTERS

124 South Main Street, Perry, MI 48872
CALL 1-517-625-4161 or TOLL-FREE
1-800-248-3823

```
07480          LDA    #03
07490 C300     TST    TMP2
07500          BEQ    C301
07510 C302     LSLA
07520          LSLA
07530          LSLB
07540          LSLB
07550          DEC    TMP2
07560          BNE    C302
07570 C301     COMA
07580          ANDA   [TLOC]
07590          STA    [TLOC]
07600          ORB    [TLOC]
07610          STB    [TLOC]
07620 C24      JSR    NXTSET
07630          BRA    C22
07640 *
07650 SHPADR   TFR    A,B
07660          CLRA
07670          ADDD   #SHTBL
07680          TFR    D,Y
07690          LDD    ,Y
07700          STD    STSH
07710          RTS
07720 *
07730 RNDVEC   LDA    RND1
07740          LDB    #243
07750          MUL
07760          ADDD   #01
07770          ADDD   SCRLOC
07780          STB    TVEC
07790          STB    RND1
07800          TFR    B,A
07810          CLR    VOUT
07820          CLR    VOU2
07830          ANDA   #01
07840          BEQ    V01
07850          LDD    #$FF80
07860          STD    VOUT
07870          BRA    V02
07880 V01      LDA    TVEC
07890          ANDA   #02
07900          BEQ    V02
07910          LDD    #128
07920          STD    VOUT
07930 V02      LDA    TVEC
07940          ANDA   #04
07950          BEQ    V03
07960          LDD    VOUT
07970          SUBD   #01
07980          STD    VOUT
07990          BRA    V04
08000 V03      LDA    TVEC
08010          ANDA   #$08
08020          BEQ    V04
08030          LDD    VOUT
08040          ADDD   #01
08050          STD    VOUT
08060 V04      LDD    VOUT
08070          BEQ    RNDVEC
08080          RTS
08090 DIRVEC   LDD    XSCLOC,X
08100          ANDB   #$80
08110          STD    TVEC
08120          LDD    TARGET
08130          ANDB   #$80
08140          SUBD   TVEC
08150          CMPD   #0
08160          BLE    C80
08170          LDD    #256
08180          BRA    C81
08190 C80      BEQ    C81
08200          LDD    #$FF00
08210 C81      STD    VOUT
08220          LDB    XSCLO2,X
08230          ANDB   #$7F
08240          STB    TVEC
```

```
08250          LDB    TARGT2
08260          ANDB   #$7F
08270          SUBB   TVEC
08280          BNE    C82
08290          RTS
08300 C82      BGT    C83
08310          LDD    VOUT
08320          SUBD   #02
08330          STD    VOUT
08340          RTS
08350 C83      LDD    VOUT
08360          ADDD   #02
08370          STD    VOUT
08380          RTS
08390 ANTISH   LDD    XVLOC,X
08400          STD    TLOC
08410          LDA    XVBIT,X
08420          STA    TBIT
08430          LDY    STSH
08440 C17      LDA    ,Y
08450          BGE    C18
08460          RTS
08470 C18      ANDA   #$40
08480          BEQ    C19
08490          LDA    #$C0
08500          LDB    TBIT
08510          BEQ    C21
08520 C20      LSRA
08530          LSRA
08540          DECB
08550          BNE    C20
08560 C21      COMA
08570          ANDA   [TLOC]
08580          STA    [TLOC]
08590 C19      JSR    NXTSET
08600          BRA    C17
08610 *
08620 OKMOV    LDD    VLOC
08630          STD    TLOC
08640          LDA    VBIT
08650          STA    TBIT
08660          LDY    STSH
08670 O02      LDA    ,Y
08680          BGE    O03
08690          LDA    #$04
08700          TFR    A,CC
08710          RTS
08720 O03      ANDA   #$40
08730          BEQ    O04
08740          LDA    #$C0
08750          LDB    TBIT
08760          BEQ    O05
08770 O06      LSRA
08780          LSRA
08790          DECB
08800          BNE    O06
08810 O05      ANDA   [TLOC]
08820          BEQ    O04
08830          CLRA
08840          TFR    A,CC
08850          RTS
08860 O04      JSR    NXTSET
08870          BRA    O02
08880 BSTATE   CLR    BUTTON
08890          LDA    65280
08900          CMPA   #255
08910          BEQ    NOTP
08920          CMPA   #127
08930          BEQ    NOTP
08940          INC    BUTTON
08950 NOTP     RTS
08960          RTS
08970 *
08980 * The following table should be
08990 * included with each program.
09000 *
09010 IXSTRT   EQU    *-9
```

```
09020 CH1LOC   EQU    *+1
09030 CLIST    RMB    900
09040 CLEND    EQU    *-1
09050 ZZZ      EQU    *
09060 BLUEUP   EQU    $49
09070 BLUEUR   EQU    $59
09080 BLUERT   EQU    $51
09090 BLUEDR   EQU    $55
09100 BLUEDN   EQU    $45
09110 BLUEDL   EQU    $65
09120 BLUELF   EQU    $61
09130 BLUEUL   EQU    $69
09140 BLUE     EQU    $41
09150 REDUP    EQU    $4A
09160 REDUR    EQU    $5A
09170 REDRT    EQU    $52
09180 REDDR    EQU    $56
09190 REDDN    EQU    $46
09200 REDDL    EQU    $66
09210 REDLF    EQU    $62
09220 REDUL    EQU    $6A
09230 RED      EQU    $42
09240 WHTUP    EQU    $4B
09250 WHTUR    EQU    $5B
09260 WHTRT    EQU    $53
09270 WHTDR    EQU    $57
09280 WHTDN    EQU    $47
09290 WHTDL    EQU    $67
09300 WHTLF    EQU    $63
09310 WHTUL    EQU    $6B
09320 WHITE    EQU    $43
09330 BLKUP    EQU    $48
09340 BLKUR    EQU    $58
09350 BLKRT    EQU    $50
09360 BLKDR    EQU    $54
09370 BLKDN    EQU    $44
09380 BLKDL    EQU    $64
09390 BLKLF    EQU    $60
09400 BLKUL    EQU    $68
09410 BLACK    EQU    $40
09420 UP       EQU    $08
09430 RIGHT    EQU    $10
09440 DOWN     EQU    $04
09450 LEFT     EQU    $20
09460 DONE     EQU    $FF
09470 *
09480 * CLIST FIELD OFFSETS
09490 XSHAPE   EQU    0
09500 XSCLOC   EQU    1
09510 XSCLO2   EQU    2
09520 XAUX     EQU    3
09530 XVLOC    EQU    4
09540 XVBIT    EQU    6
09550 XVECT    EQU    7
09560 XNEXT    EQU    9
09570          ORG    DPVAL*256
09580 TMP1     RMB    1
09590 TMP2     RMB    1
09600 TMP3     RMB    1
09610 SCRLOC   RMB    1
09620 SCRLO2   RMB    1
09630 SHAPE    RMB    1
09640 VLOC     RMB    2
09650 VBIT     RMB    1
09660 TBIT     RMB    1
09670 TLOC     RMB    2
09680 VOUT     RMB    1
09690 VOU2     RMB    1
09700 STSH     RMB    2
09710 TVEC     RMB    2
09720 RND1     RMB    1
09730 AUX      RMB    1
09740 GRAVTY   RMB    2
09750 TARGET   RMB    1
09760 TARGT2   RMB    1
09770 BUTTON   RMB    1
09780          END
```

CRC COMPUTERS

The COCO hardware store

Fantastic Super Controller II

DISTO SUPER CONTROLLER II

- Radio Shack/Tandy controller compatible.
- Works on all COCOs - 1, 2 or 3 with or without Multi-Pak Interface.
- One 24/28 pin socket for 8K ROM, 2764, or 27128 EPROM.
- Internal MINI-EXPANSION-BUS connector for one DISTO Super Add-On.
- Low Power draw; within COCO's requirements.
- Gold Plated edge connectors.
- Under OS-9:
  - Buffered Read/Write sector achieved without halting the CPU.
  - Continual use of keyboard even while reading or writing to disk.
  - System's clock no longer looses time during Read & Write.
  - NMI is blocked and transferred to IRQ in software for low CPU overhead.
  - Completely Interrupt driven for fast & smooth Multi-Tasking operations.
  - Drivers written by KEVIN DARLING

$130.

DISTO Super Controller I

$99.95

A Superb Controller. Along with the included C-DOS, plug-in three more software selectable DOSes or 2764 or 27128 EPROMs burned to your liking.

The Internal Mini-Expansion-Bus lets you add some incredible features to the controller. Disto Super Add-Ons were designed to fit neatly inside the controller case.

NEW DISTO 3 in 1 Multi-Board Adapter

$59.95

This Muti-Board is an adapter that plugs in any Disto Super Controller, Ramdisk or MEB Adapter.

It includes a new and improved Printer Port (Centronics compatible), a faster Real Time Clock (works at 2MHz.) and a true RS-232 Serial Port (external 12 volt AC adapter required). DB25 cable included.

It fits neatly inside the metal case and is still within Tandy's power limits. It also works with or without a Multi-Pak.

NEW DISTO RS-232 SuperPack

$49.95

- A Stand-Alone (Multi-Pak required) adapter that gives the user a true RS-232 Serial Port.
- Completely compatible with OS9's ACIA software.
- Compatible with software that requires the Tandy Deluxe RS-232 Pack.
- DB-25 cable included.

DISTO SUPER ADD-ONS

- **Real Time Clock & Printer Interface** **$39.95**
  Have the Real Time, Date and Year displayed on your screen at a simple command.
- **Mini EPROM Programmer** **$54.95**
  A LOW COST EPROM Programmer that attaches directly to any Disto Super Controller or MEB adapter to program those often used utilities.
- **Hard Disk Interface** **$49.95**
  A Hard Disk Interface fully compatible with SASI controller. Fits inside the Super Controller, Ramdisk or MEB Adapter. OS-9 drivers included. Also available with RS-232 Serial Port.
- **Super RAM 3 ZeroK Board** **$CALL**
  Now is the time to upgrade your COCO 3 to 512K of memory. Just add the memory chips and install in your COCO 3.
- **MEB Adapter** **$24.95**
  A Stand-Alone Mini-Expansion-Bus in which you can plug any other Disto Adapter directly in a Multi-Pak without the need for a Super Controller or Ramdisk.

4 in 1 Super Board

Coming this fall to a dealer near you

Real Time Clock, Printer Port,
RS-232 & Hard Disk Interface
all in one neat package

CRC COMPUTERS INC.

10802 Lajeunesse, Montreal,
Quebec, Canada H3L 2E8

1-514-383-5293

We accept phone orders • Call for Canadian Prices
Include S&H of $4 or $8 if order exceeds $75

Master Card and Visa Accepted

Sorry: No personal cheques

Simplify and organize Adventure playing without ruining the fun

Adventure Game Mapping Techniques

By John Dillon

Adventure games can perhaps be defined as logical puzzles involving people in unusual situations. Using this definition, it is fair to say that Adventures have been with us for generations. Over a hundred years ago Sam Loyd was delighting readers with hundreds of situations that required careful thought and mapmaking ability. Even a traditional detective story is an adventure — the reader wanders through an assortment of rooms, finding clues and trying to figure out "who done it" and where the treasure is hidden.

However, in a novel the reader has no control over the detective's words or action — the reader is a purely passive player. (The term "player" was chosen over "spectator" because a well-written novel will get the reader more involved than merely spectating.)

Our current concept of Adventure games overcomes the passivity of literary adventures. No longer must a player watch in frustration as the hero drinks a fluid that *everyone* knows is poison — now the player can shatter the vial instead, realizing too late that the fluid is nitro-glycerin!

Because the players are now in control of the action, it becomes imperative that they understand their surroundings and position amidst them. As in the days of yore, the best way to know where you are is to make and use a map. While there are a variety of techniques available, this article will focus on a method that has been personally successful. First, a couple of comments are in order. One: Let us define a "room" as any unique position in the game, whether it is an actual room, a pathway or corridor, or even a section of a single chamber. Two: *Use a pencil!* Though this is intuitively obvious, it is still frequently overlooked. Cartography is a detailed process that usually requires many changes before an acceptable final product is obtained.

John Dillon is an engineer for Rockwell International, designing automatic test equipment and writing control code for the instruments. He is also a songwriter and a student. His hobbies include reading and travelling by motorcycle.

Mapmaking Tools

It has been said that a sign of man's intelligence is his ability to make and use tools. A useful tool for Adventurers is a mapsheet devised to ease the chore of Adventure mapping. [See Neil Haupt's *Mapper* program (August '87, Page 90), which prints a blank mapsheet on an 80-column printer.] While it is quite simple to use, it can contain a lot of information. Here is the procedure, using Figure 1 as an example.

First, arbitrarily select and label a box as the game's starting point. Then indicate the obvious exits with short labeled stubs. In this example, the game starts with "You are in front of a castle. Obvious exits are North and East. You see nothing special." Figure 1a shows this starting room (labeled "Front of Castle") and the possible exits ('N' and 'E'). Note that north doesn't have to be up as on a regular map. Just be sure to label the map such that there is no confusion.

Next, try to discover where each of the exits go. In this game, going east would put you on a drawbridge, while north plants you firmly in the forest. When you enter a new room, repeat the process of Step 1, e.g., label the room and show possible exits as shown in Figure 1b.

Now that you have explored the obvious exits for the starting room, go back (if you can) and try unmarked directions, since sometimes you can travel in directions not explicitly described. For example, in trying "down" from the front of the castle, you discover that "You are now wading in the moat. Several crocodiles are eyeing you hungrily." This means that you need to add a room, as shown in Figure 1c.

Sometimes a passage is unidirectional (Figure 1d). Indicate this with an arrowhead to show that you can't get back. For example, after trying all other directions while in the moat, you discover that you can't return to the front of the castle because "The banks are too steep and slippery; you keep falling back into the water."

After exploring all possible exits (including Climb, Jump, Run, etc., if appropriate) for a particular room, it's useful to mark the map so that you know that all exits have been exhausted. One way is to put an 'X' in the lower left corner, as shown in Figure 1e.

Figure 1f shows some other useful

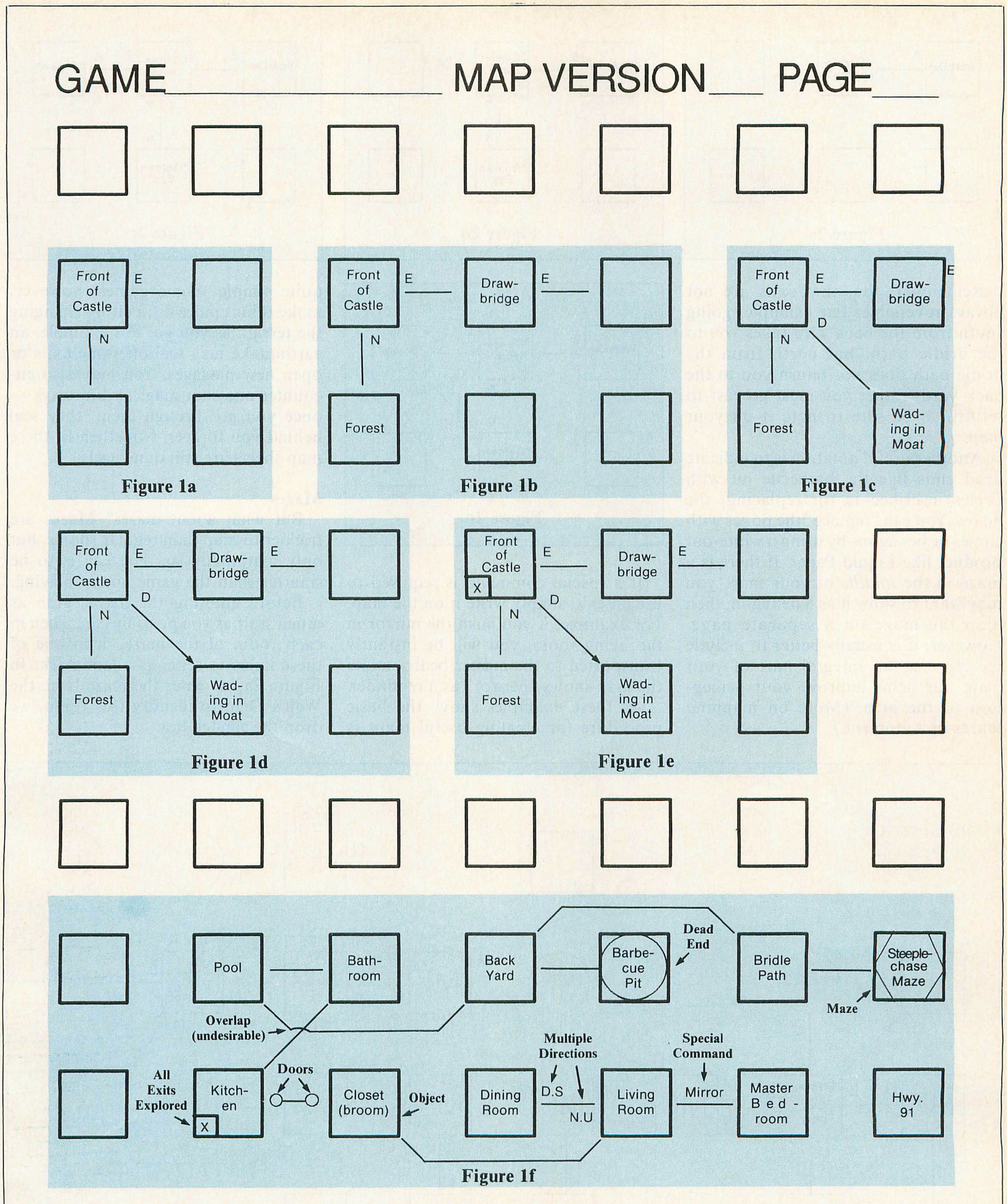

GAME ____ MAP VERSION ___ PAGE ___
Front of Castle
E
N
Forest
Draw-bridge
D
Wad-ing in Moat
X
Pool
Bath-room
Back Yard
Barbe-cue Pit
Dead End
Bridle Path
Steeple-chase Maze
Maze
Overlap (undesirable)
Multiple Directions
Special Command
All Exits Explored
Kitch-en
Doors
Closet (broom)
Object
Dining Room
D.S
N.U
Living Room
Mirror
Master Bed-room
Hwy. 91

Figure 1a

Figure 1b

Figure 1c

Figure 1d

Figure 1e

Figure 1f

Figure 1

mapping notations. A small circle on a box indicates that a door has to be opened before you can exit in that direction. Parentheses can identify the objects found in a room, such as a broom in the closet. If multiple directions take you to the same room, you can indicate both on a single line, such as in the living room.

After a while the map may get convoluted, with one path crossing another a dozen times. When this happens, carefully redraw the map on a new mapsheet. Often, with judicious layout, you can eliminate crossovers.

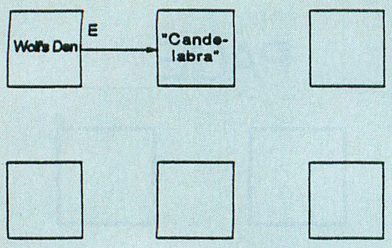

Wolf's Den
E
"Candelabra"

Figure 2a

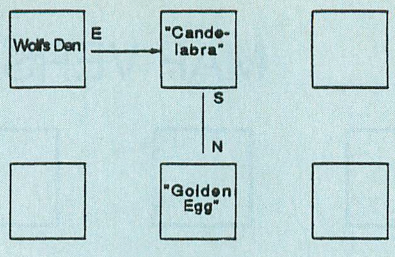

Wolf's Den
E
"Candelabra"
S
N
"Golden Egg"

Figure 2b

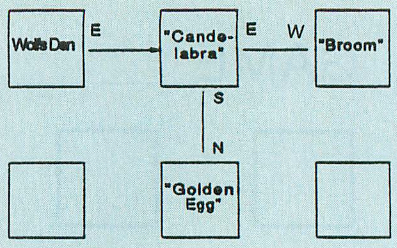

Wolf's Den
E
"Candelabra"
E
W
"Broom"
S
N
"Golden Egg"

Figure 2c

Remember, too, that exits are not always reversible. For example, going south from the back yard takes you to the bridle path, but north from the bridle path does *not* return you to the back yard; rather you must go east to return, so be sure to note it on your map.

Another useful notation is to indicate dead ends like the barbecue pit with circles inscribed in (or replacing) the boxes. You can "replace" the boxes with circles or hexagons by using a white-out product like Liquid Paper. If there is a maze in the *middle* of your map, you may want to show it as a hexagon, then map the maze on a separate page. However, it is usually better to include the maze as an integral part of your map; this helps improve your perception of the area. (More on mapping mazes in a moment.)

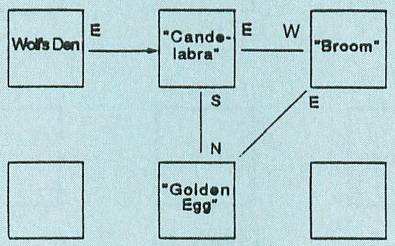

Wolf's Den
E
"Candelabra"
E
W
"Broom"
S
E
N
"Golden Egg"

Figure 2d

If a special command is required to use an exit, simply write it on the map. For example, if you push the mirror in the living room, you will be instantly transported to the master bedroom, so the map shows "Mirror" as a reminder.

As these examples show, the basic procedure for creating useful maps is quite simple. Some games, however, make things more difficult by changing the terrain as you go. For example, an earthquake may seal off some exits or open new passages. You may also encounter one-shot magical doorways — once you go through them, they seal behind you forever. Nonetheless, these map sheets are still quite useful.

Mazes

But what about mazes? Mazes are trickier to map than regular rooms, but only marginally so. The key is to be smarter than the game you're playing.

Before entering the maze, grab as much stuff as you possibly can. Then in each room of the maze, drop one of these items to serve as a landmark. In Figure 2a, we enter the maze from the Wolf's Den; to identify this room, we drop the candelabra.

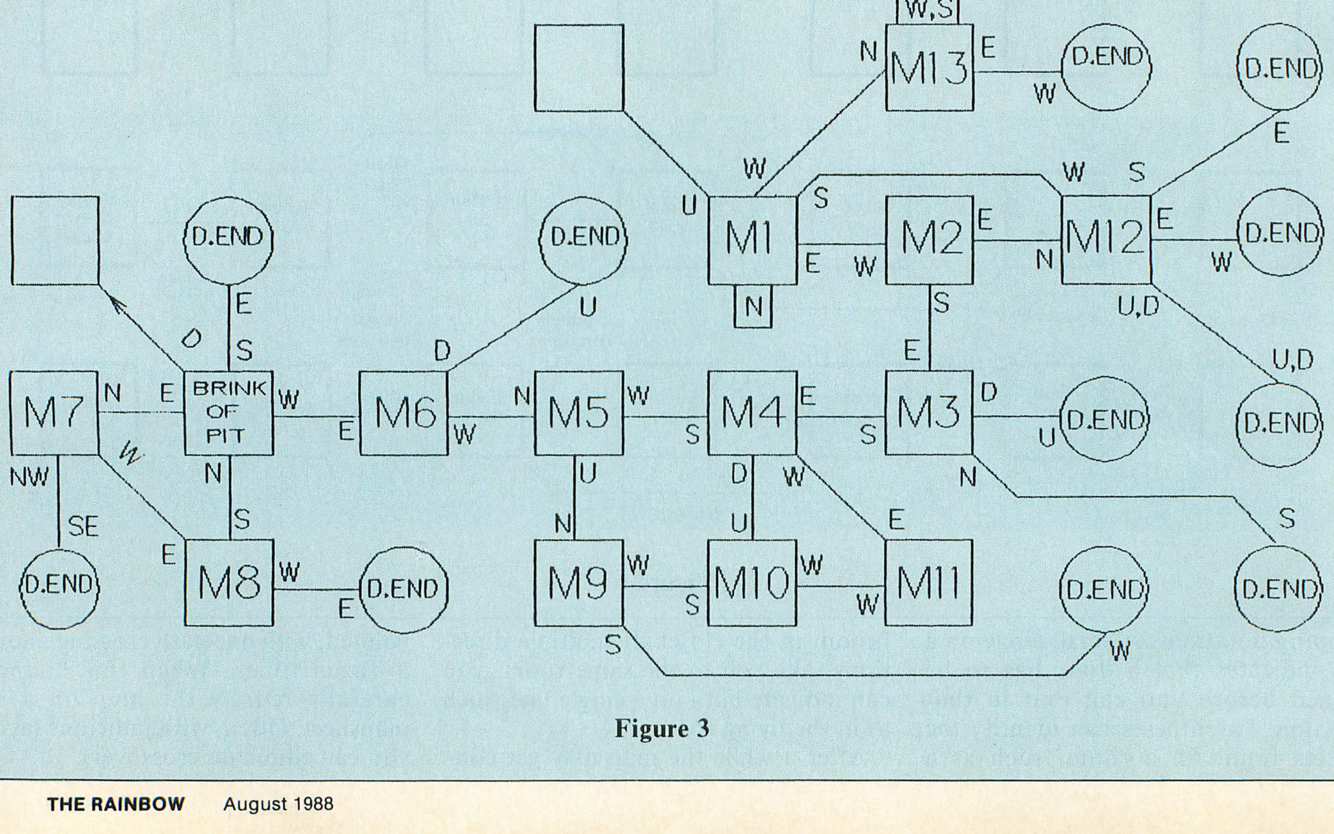

W,S
N
M13
E
W
D.END
D.END
E
W
S
W
S
U
M1
E
W
M2
E
N
M12
E
W
D.END
N
U,D
U,D
D.END
D.END
E
S
D.END
D
U
S
E
M7
N
E
BRINK OF PIT
W
E
M6
W
N
M5
W
S
M4
E
S
M3
D
U
D.END
D.END
W
NW
SE
N
S
U
N
D
U
W
E
N
S
D.END
E
M8
W
E
D.END
M9
W
S
M10
W
W
M11
D.END
D.END
S
W

Figure 3

As we wander around the maze, we continue to drop stuff behind us, marking the items we left on our map. (By the way, it is important to wander through the maze in a logical fashion, using the same techniques discussed earlier.) In our example, going south from "candelabra" (Figure 2b) put us in another maze-room, so we drop another item, this time the golden egg. Our inquisitive minds want to check the backward path, so we go north from "golden egg," and *voila!* we are indeed back in the "candelabra" room. Next we try east, ending up in "broom" (Figure 2c). West from "broom" puts us back at "golden egg," and we have already established some order to what once seemed to be a formidable labyrinth (Figure 2d).

As you get deeper into the maze, you must go back to the beginning portion to retrieve and reuse your landmark objects. If your game has a Save feature, using it can expedite this process.

After the maze has been solved, identify these rooms on your map as M1, M2, M3, etc., where 'M' stands for "maze." Figure 3 shows a portion of the maze in one of Radio Shack's more popular Adventures.

> ***"By using mapmaking tools, solving Adventures becomes a simpler, more organized task — without depriving you of any of the fun and challenge."***

Sometimes a game may have more than one maze. RAINBOW's *Rescue on Alpha II*, for example, has both the caverns and botanical gardens. As a result, my map shows rooms BG1, BG2, etc., and C1, C2, C3, etc., thereby keeping them distinct.

For more information on mapping mazes (and on Adventure games in general) refer to *Compute!'s Guide to Adventure Gaming*. It is also an excellent reference source for people who want to write their own games. It was this book that first taught me the key to maze mapping.

Though Adventure games are exciting and challenging, they are also relaxing. Upon solving a good Adventure, you are left with a feeling of satisfaction knowing that you are clever enough to outwit a computer. By using mapmaking tools such as those described in this article, solving Adventures becomes a simpler, more organized task — without depriving you of any of the fun and challenge. Good luck, and may you always be smarter than the games you play!

(Questions or comments concerning this tutorial may be directed to the author at P.O. Box 6026, Fullerton, CA 92634. Please enclose an SASE when requesting a reply.)

One-Liner Contest Winner . . .

I read with interest Dennis Weide's article in the February '88 issue (Page 126) concerning reversing the PMODE screen in BASIC and Pascal. His BASIC program took one hour, and his Pascal program took one minute. My one-liner uses some of CoCo BASIC's built-in commands to perform the same task in 30 seconds! By using GET, PUT and PCOPY, CoCo can do the job quickly and efficiently — without peeks, pokes or Pascal!

The listing:

```
1 PCLEAR8:PMODE4,5:PCLS:SCREEN1,
1:DIMIN(256):Y=255:FORX=0TO255:P
MODE4,1:GET(Y,0)-(Y,191),IN,G:PM
ODE4,5:PUT(X,0)-(X,191),IN,PSET:
Y=Y-1:NEXTX:FORJ=1TO4:PCOPYJ+4TO
J:NEXTJ
```

John Collicott
Inman, KS

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

Two-Liner Contest Winner . . .

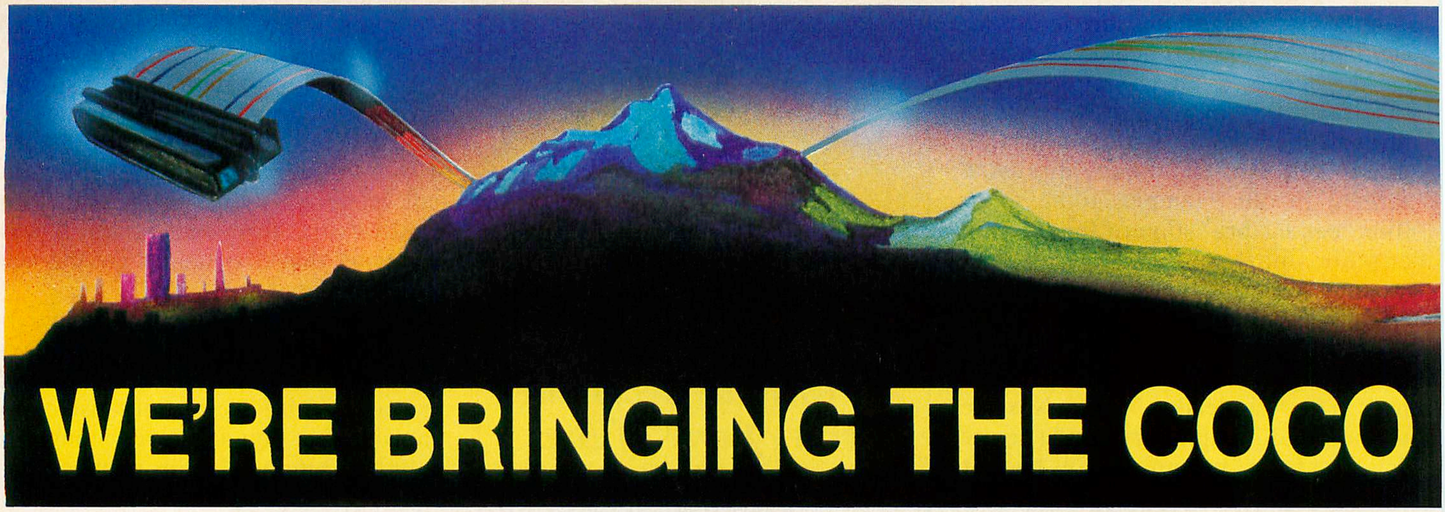
Here is a CoCo 3 expression of a sentiment most undoubtedly felt by all CoCo owners!

The listing:

```
10 PMODE3,1:PCLS3:SCREEN1,0:CIRC
LE(128,99),90,4,.95:PAINT(128,99
),4,4:COLOR2:DRAW"BM128,40R9L18R
9D20R9L18":DRAW"BM60,70D20R18BM8
8,70D20R18U20L18BM117,70D20R18U2
0BM146,70D20R18L18U10R18L18U10R1
8BM146,100D20U20R9D10U10R9D20BM1
75,100D20R18U20D40"
20 POKE65495,0:DRAW"BM80,130D20R
18L18U20R18BM108,130D20R18U20L18
BM136,130D20R18L18U20R18BM164,13
0D20R18U20L18":PAINT(0,0),1,4:PA
INT(0,0),2,4:PAINT(0,0),3,4:PMOD
E3,1:SCREEN1,1:PAINT(0,0),2,4:PA
INT(0,0),1,4:PAINT(0,0),3,4:PMOD
E3,1:SCREEN1,0:RUN
```

Doug Fingliss (Age 9)
Tiverton, RI

(For this winning two-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)



RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together *to allow CoCo owners* all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $25 to give *your* account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles,** helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $24.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $32.15 value as a ***free bonus!***

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our $31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

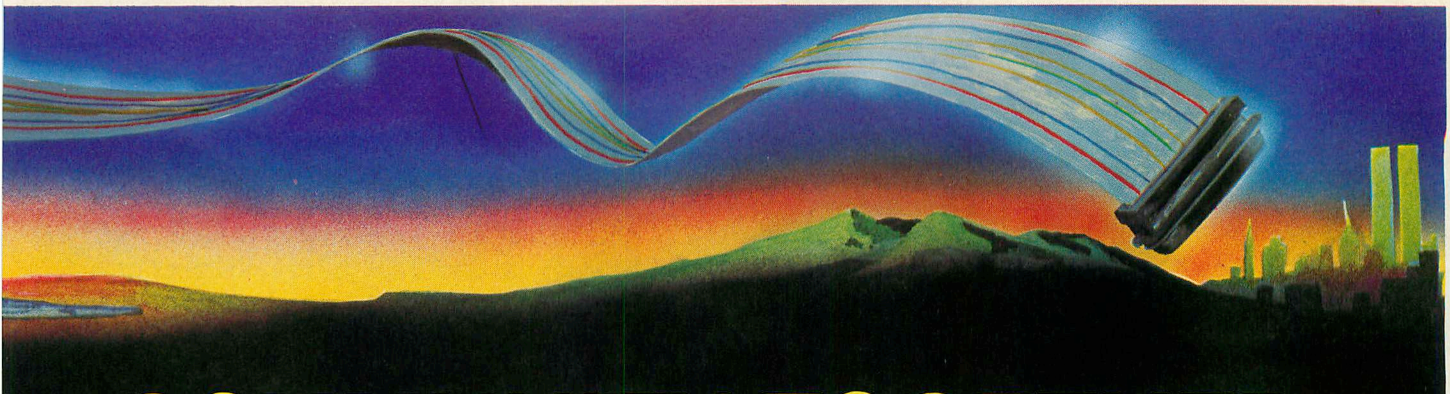
Want to save even more? While you're online you can order, for only $29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* ($21.95) and a total of three hours of connect time ($21.60).

Delphi provides us all with **Immediate CoCo Community**. Check it out today. After all, you can sample it for free!

Problems? Call Delphi:
(800) 544-4005
(617) 491-3393

DELPHI

TYPE:
GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $10.80 (U.S.) per hour.

On Telenet: Uninet network has merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call the local access number and make connection, press ENTER twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type `C DELPHI` and press ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi's new rates indicate an additional $10.80 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 3110 6170 3088 through Telenet, or 3106 90 6015 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `RAINBOW`. Then, at the "NUMBER:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `SENDRAINBOW` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just use Control-X and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

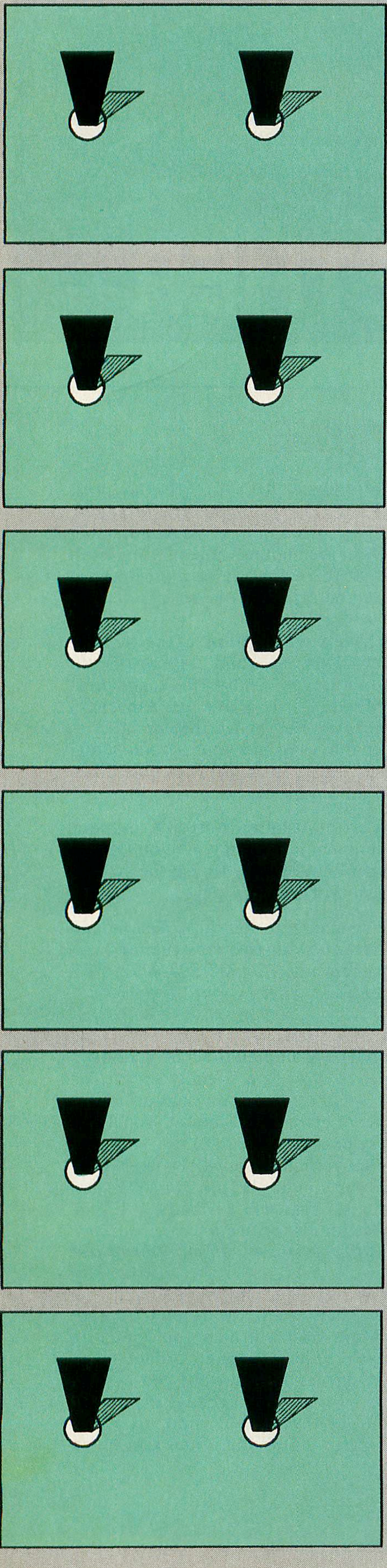
Come Visit Us! Type: `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is verified and opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**



A hardware project to handle the switching of the joystick and cassette ports.

The Old Switcheroo II

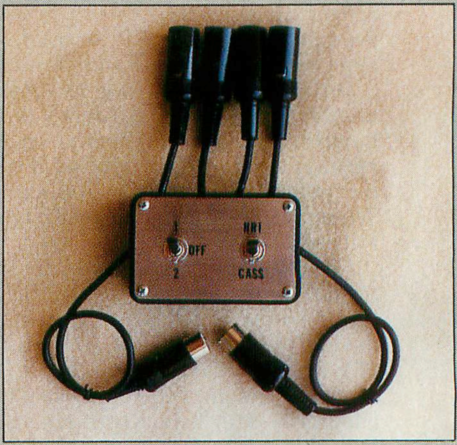
By Mark Haverstock

In the August '86 RAINBOW [Page 108], I presented a hardware project designed to switch among joysticks, trackballs, mice and other devices that use the joystick ports. It was designed to save CoCo owners the hassle of plugging and unplugging these items by allowing one joystick port to accommodate more than one device.

With the introduction of Tandy's Hi-Res Joystick Interface, another problem appears. Both the joystick port and cassette port must now be shared with the Hi-Res Interface. Enter the Old Switcheroo II. This switchbox will handle the switching of both the joystick and cassette ports. Armed with a few inexpensive parts and tools, you can build this convenient accessory for your CoCo 2 or 3.

The Joystick Switcher

Based on comments from several readers who wrote to me about the joystick switcher, I learned that most use the project to switch only two items, such as a mouse and a joystick. The new version is set up to switch two items. It also has a center OFF position to disable both devices. The OFF position is particularly important for programs that are adversely affected by having joysticks plugged in during operation. A double-pole, double-throw switch has been substituted for the rotary switch that appeared in the original version because it is easier to wire. The switcher can be used with either joystick port, or with external devices such as the *CoCo Max* Hi-Res Pak.



The Cassette Port Switcher

The Hi-Res Joystick Interface (Cat. No. 26-3028) uses both the joystick and cassette ports. This, of course, presents a problem for cassette recorder users who will need to plug and unplug the recorder. The Switcheroo II utilizes a double-pole, double-throw switch also to activate either the cassette recorder or the Hi-Res Interface.

You will need the following parts: One six-pin DIN plug (Cat. No. 274-

---

Mark Haverstock teaches computer applications for the Boardman schools in Youngstown, OH. His hobbies include computing, photography and amateur radio.

020); two six-pin inline DIN jacks (Cat. No. 274-021); a five-pin DIN plug (Cat. No. 274-003); two five-pin inline DIN jacks (Cat. No. 274-005); an experimenter box (Cat. No. 270-2301); a DPDT switch with a center OFF position (Cat. No. 275-664); a DPDT switch (Cat. No. 275-663); 4 feet of five-conductor wire; dry-transfer lettering; epoxy; and electrical tape or heat-shrink tubing.

The required tools include the following: a drill, ¼-inch drill bit, flat metal file, small screwdriver, small Phillips screwdriver, wire strippers, pliers, soldering iron and solder.

Construction

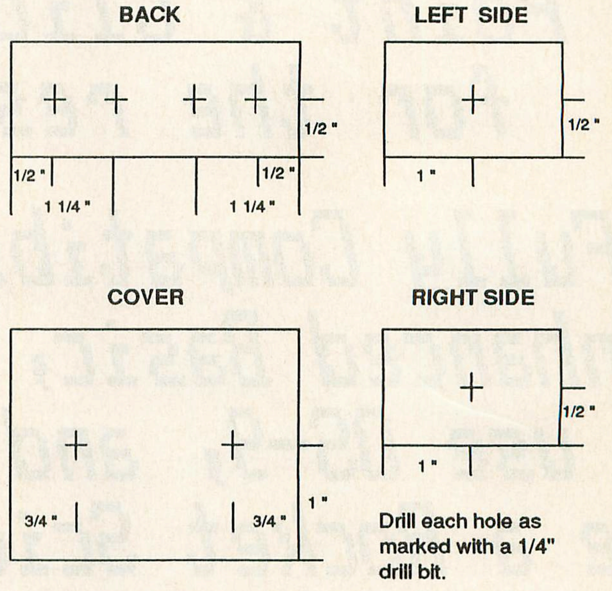
Construction of the Switcheroo II will be described in three parts: the preparation of the project box, wiring the joystick port switch, and wiring the cassette port switch. Do each in order to avoid wiring errors.

First, take the metal cover off the project box, removing the four Phillips screws at each corner. Mark the positions of the holes to be drilled in the plastic portion of the box (see Figure 1). Then drill these holes using the ¼-inch drill bit. Use the file to remove any burrs from the inside of the box.

Mark the positions of the switch mounting holes on the metal cover. Drill these holes with the ¼-inch drill bit. Again, remove any burrs from the rear of the cover. Find the positions for SW1 and SW2 as shown in Figure 1, and apply dry transfer lettering at these positions.

Switch 1-Joystick Port

The next step is to wire SW1 for the joystick port. If you cannot obtain five-conductor cable, substitute five #22-gauge



Drill each hole as marked with a 1/4" drill bit.

Figure 1: Preparation of The Switcheroo Enclosure.

TURBO RAM BOARD

$39.95
ZERO K

$119.95
512 K

- Fast 120 nsec RAM chips
- Easy-to-follow instructions
- No soldering
- Includes RAM Board Utilities

PYRAMIX Arcade Game $19.95

BACKUP LIGHTNING (disk duplicator) $14.95

RAM BOARD UTILITIES
- RAM Disk for RSDOS
- Print Spooler
- Sophisticated MEMORY TEST Program

$19.95

PAL UPGRADE
$7.95
for grey or white
MULTI-PACK (26-3024)

DUAL-MODE CONTROLLER

$99.95*

*ROM not included (RS DOS 1.1 ROM—$19.95). 32K SRAM—$16.95.

- 100% Compatible with existing H/W & S/W
- No MULTI-PACK required (low power draw)
- 8K Cache memory (expandable to 32K)
- Track Reads(programs load up to 2x faster)
- Two Switched Sockets (supports 8K ROM, 2764/27128/27256 EPROMs)
- Gold Contacts for reliability
- Easy Installation (no cutting, soldering, jumpers or external wires)
- Runs under OS-9 with:
  - no-halt read/write
  - interrupts and multi-tasking enabled
  - reliable clock and type-ahead

S&H: $3.50 U.S. and Canada ($15 foreign)
COD: $2.25 U.S. only
2ND Day Air: $1.50 (contiguous U.S. only)
Tax: inside California add 6%
VISA or MC accepted

30 DAY MONEY-BACK GUARANTEE PLUS FULL 1 YEAR WARRANTY ON ALL PRODUCTS!

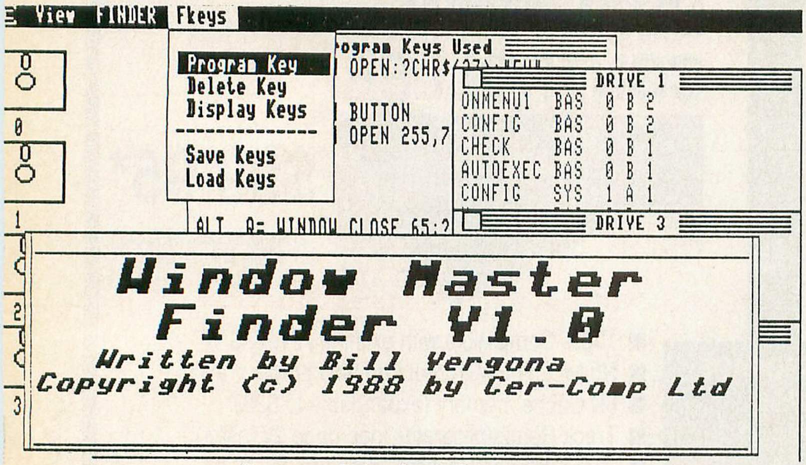
Prices subject to change without notice

Send check or money-order to:
Performance Peripherals
11432 Pena Way
Mira Loma, CA 91752
Or Call (714) 681-3007

"Window Master"

A Point & Click Window System for the rest of us!!!

Fully Compatible with R.S. Dos Enhanced Basic, it does not need or use OS-9, and you don't have to be a Rocket Scientist or a P.H.D. to use Windows, Pull Down Menus, Buttons, Icons, Edit fields or Mouse Functions in your Programs!



```
OPEN:?CHR$(27);"FUL
BUTTON
OPEN 255,7
ALT  A= WINDOW CLOSE 65:2
```

```
ONMENU1  BAS  0 B 2
CONFIG   BAS  0 B 2
CHECK    BAS  0 B 1
AUTOEXEC BAS  0 B 1
CONFIG   SYS  1 A 1
```

Window Master
Finder V1.0
Written by Bill Vergona
Copyright (c) 1988 by Cer-Comp Ltd

Screen Display Fonts

Window Master supports up to 54 different character sizes on the screen with 5 different character styles. You can have Bold, Italic, Underlined, Super-Script, Sub-script or Plain character styles or any combination of them in any character size. You can also change the text color and background at any time to get really colorful displays.

Fully Basic Compatible

Window Master is fully compatible with Enhanced Color Disk basic with over 50 Commands & functions added to fully support the Point & Click Window System. Window Master does not take any memory away from Basic, so you still have all the Basic Program memory available.

Hi-Resolution Displays

Window Master uses the full potential of the Color Computer 3 display by using the 225 vertical resolution display modes instead of the 192 or 200 resolution modes like most other programs. It uses either the 320/16 color mode or the 640/4 color display to give you the best display resolution possible, and can be switched to either mode at any time.

Window Master Features

Multiple Windows

Window Master supports multiple window displays with up to a maximum of 31 windows on the screen. Overlapping windows are supported, and any window can be made active or brought to the top of the screen. Windows can be picked up and moved anywhere on the screen with the mouse. There are 6 different Window styles to choose from and the window text, border and background color is selectable.

Pull Down Menus

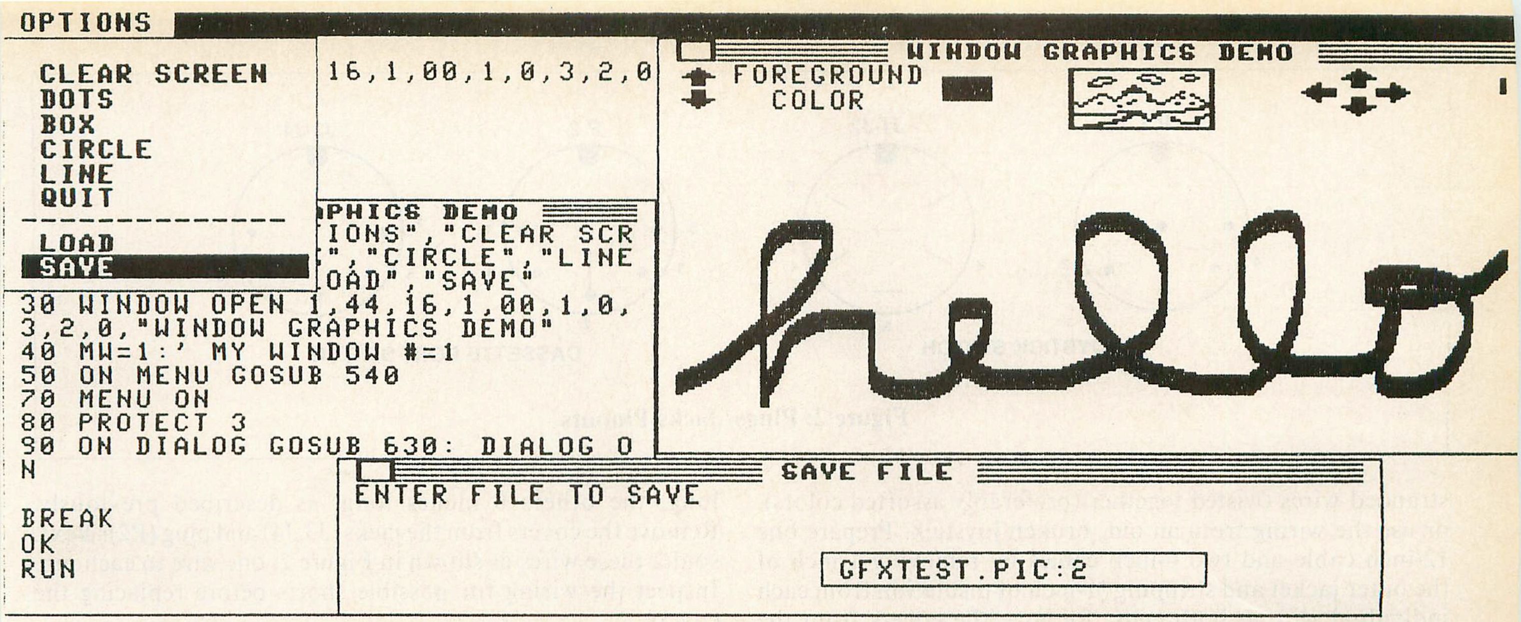
Menus are completely programmable with up to 16 menus available. They can be added or deleted at any time in a program. Menu items can be enabled, disabled, checked or cleared easily under program control. Menu selection is automatically handled by Window Master & all you have to do is read a function variable to find out which menu was selected.

Buttons, Icons & Edit Fields

Each Window can have up to 128 buttons, Icons or Edit fields active, if you can fit that many. Buttons, Icons and Edit field selection is handled automatically by Window Master when the mouse is clicked on one. All you have to do is read a Dialog function to find out which Button, Icon, or Edit field was selected, its very simple.

Mouse & Keyboard Functions

Window Master automatically handles the Mouse pointer movement, display and button clicks. It will tell you the current screen coordinate, the local window coordinate, window number the mouse is in, the number of times the button was pressed, which window number it was clicked in and more. The Keyboard is completely buffered, and supports up to 80 programmable Function keys that can contain any kind of information or command sequences you can imagine. You can load and save function key sets at any time. So, you can have special sets of function keys for different tasks. The "Ctrl" key is supported so that you have a full control code keyboard available.



```
16,1,00,1,0,3,2,0
```

```
APHICS DEMO
TIONS","CLEAR SCR
","CIRCLE","LINE
OAD","SAVE"
```

```
30 WINDOW OPEN 1,44,16,1,00,1,0,
3,2,0,"WINDOW GRAPHICS DEMO"
40 MW=1:' MY WINDOW #=1
50 ON MENU GOSUB 540
70 MENU ON
80 PROTECT 3
90 ON DIALOG GOSUB 630: DIALOG O
N
BREAK
OK
RUN
```

GFXTEST.PIC:2

Mixed Text & Graphics

Window Master fully supports both Text & Graphics displays and even has a Graphics Pen that can be used with HLINE, HCIRCLE, HSET and more. You can change the Pen width & depth and turn it on or off with simple commands. We also added Enhanced Graphics Attributes that allow graphics statements to use And, Or, Xor and Copy modes to display graphic information. With the Graphics enhancements added by Window Master, you could write a "COCOMAX" type program in Basic! In fact we provide a small graphics demo program written in Basic.

Event Processing

Window Master adds a powerful new programming feature to Basic that enables you to do "Real Time" Programming in Basic. It's called Event Trapping, and it allows a program to detect and respond to certain "events" as they occur. You can trap Dialog activity, Time passage, Menu Selections, Keyboard activity and Mouse Activity with simple On Gosub statements, and when the specified event occurs, program control is automatically routed to the event handling routine, just like a Basic Gosub. After servicing the event, the sub-routine executes a Return statement and the program resumes execution at the statement where the event occured.

Enhanced Editing Features

Window Master adds an enhanced editor to Basic that allows you to see what you edit. It allows you to insert & delete by character or word, move left or right a word or character at a time, move to begin or end of line, toggle automatic insert on/off or just type over to replace characters. The editor can also recall the last line entered or edited with a single key stroke. You can even change the line number in line to copy it to a new location in the program.

Window Master Applications

Window Master pushes the Color Computer 3 far beyond its normal capabilities, into the world of a "User Friendly" operating enviornment. We are already planning several new programs for use with Window Master. So you don't have to worry about having to write all your own programs. And don't forget that many existing Basic and M.L. programs will run under Window Master with little or no changes. The Possibilities for Application programs are endless: Spread Sheets, Word Processing, Communications, Education, Games, Graphic Design, Desk Top Publishing and on and on.

Hardware Requirements

Window Master requires 512K of memory, at least 1 Disk Drive, a Hi-Res Joystick Interface and a Mouse or Joystick.

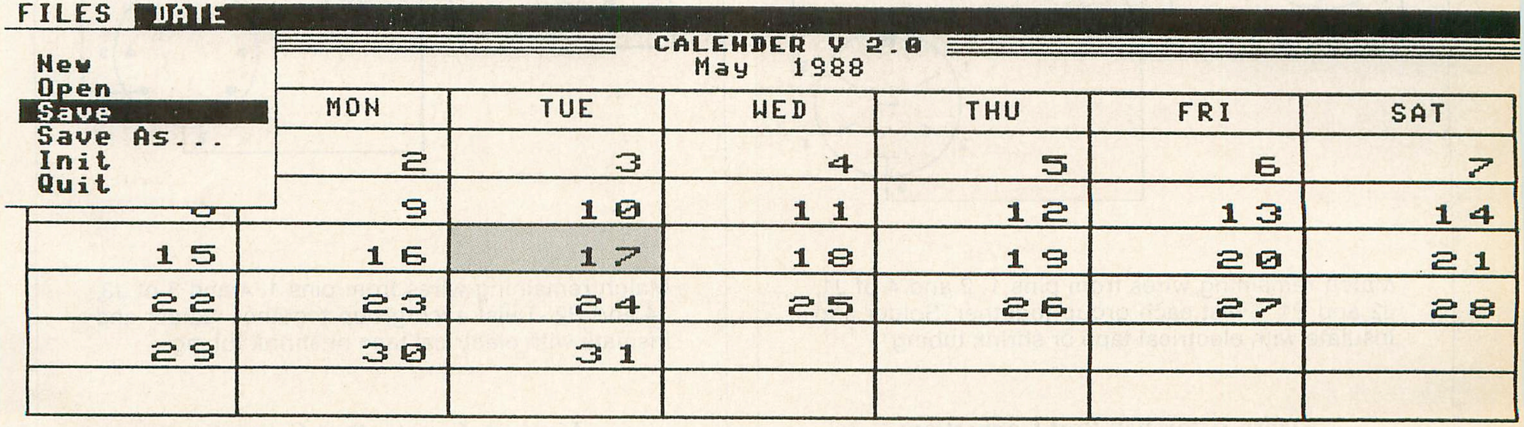
Technical Assistance

If you run into difficulty trying to use some of Window Master's features, we will be happy to assist you in any way possible. You can write to us at the address below or call us between 10am and 2pm Pacific Standard Time for a more timely response. Sorry, no collect calls will be accepted.

Ordering Information

To order WINDOW MASTER by mail, send check or money order for $69.95, plus $3.00 for shipping & handling to the address below. To order by VISA, MASTERCARD or COD call us at (702)-452-0632
(Monday thru Saturday, 8am to 5pm PST)

CER-COMP Ltd.
5566 Ricochet Avenue
Las Vegas, Nevada 89110
(702)-452-0632



May 1988

	MON	TUE	WED	THU	FRI	SAT
	2	3	4	5	6	7
	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Call for availability of 128K version!

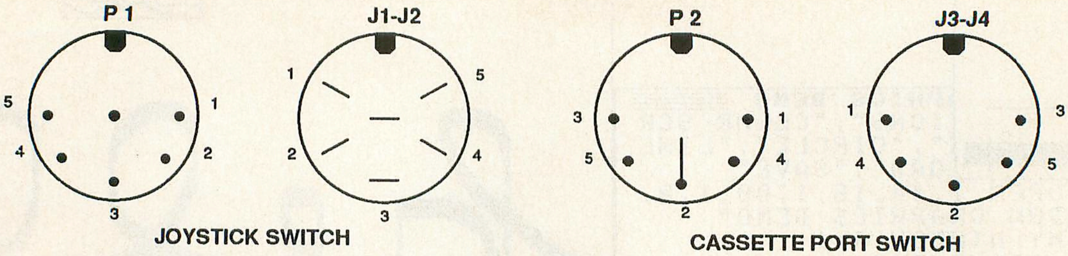


Figure 2: Plugs/Jacks Pinouts

stranded wires twisted together (preferably assorted colors), or use the wiring from an old, broken joystick. Prepare one 12-inch cable and two 6-inch cables by removing 1 inch of the outer jacket and stripping ¼-inch of insulation from each individual wire at both ends. Remove the covers from the jacks (J1,J2) and plug (P1), then solder these wires, one to each pin, as shown in Figure 2. Before replacing the covers, be sure to inspect the solder connections for shorts.

Insert the remaining ends of the wires into the three holes located on the left portion of the project box. The wires from J1 and J2 use the two holes at the rear of the box; the hole on the left side is for P1. Wire the switch (SW1) according to the schematic in Figure 3. Note that only two of these lines are switched: the +5V and ground lines. The others will be matched, soldered together and covered with electrical tape or shrink tubing.

Switch 2-Cassette Port

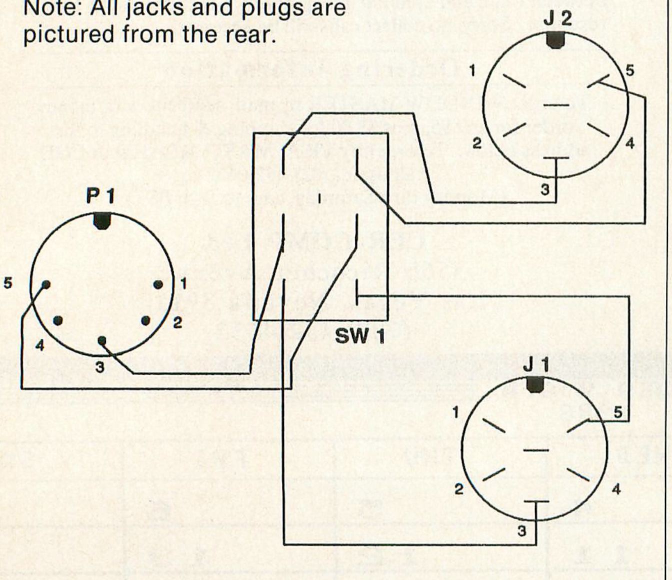
Prepare three pieces of five-conductor cable: one 12 inches long, the others 6 inches long, as described previously. Remove the covers from the jacks (J3,J4) and plug (P2). Next, solder these wires as shown in Figure 2, one wire to each pin. Inspect the wiring for possible shorts before replacing the covers.

Insert the remaining ends of the wires on the right side of the project box. The hole on the right side of the box is for P2, the remaining two in the rear are for J3 and J4. Wire the switch (SW2) according to Figure 4. Notice that as in the joystick switch, only two lines are switched. The others will be matched together, soldered and covered with electrical tape or shrink tubing. Mount both S1 and S2 on the metal cover, aligning the handle with the marked switch positions.

To secure the wires attached to the jacks and plugs, and to keep them from pulling out of the box, apply a small amount of epoxy to the point where these wires enter the inside of the box. Allow the epoxy to dry thoroughly before continuing.

Finally, reassemble the box, tucking the wires carefully

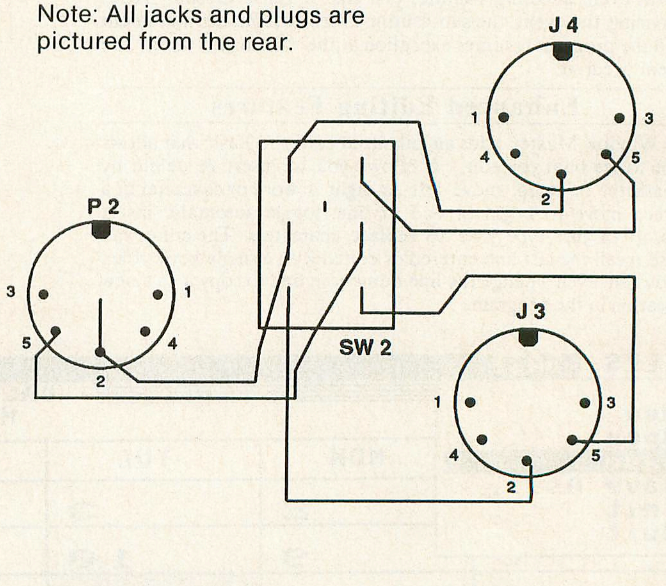
Note: All jacks and plugs are pictured from the rear.



Match remaining wires from pins 1, 2 and 4 of J1, J2 and P1. Twist each group together. Solder and insulate with electrical tape or shrink tubing.

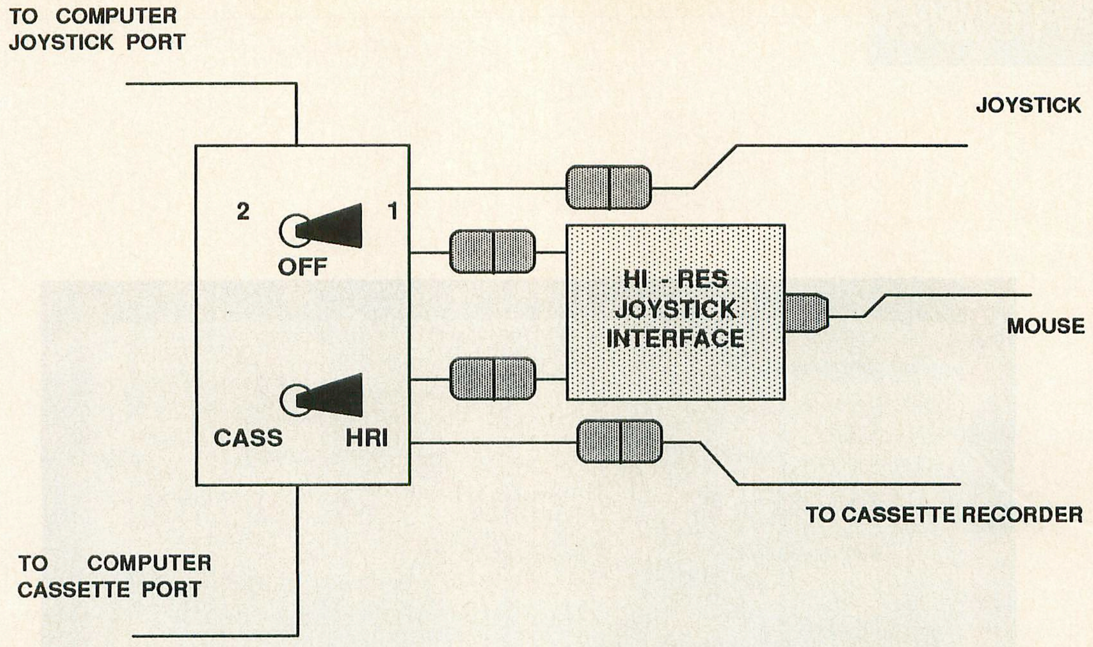
Figure 3: Joystick Port Connections

Note: All jacks and plugs are pictured from the rear.

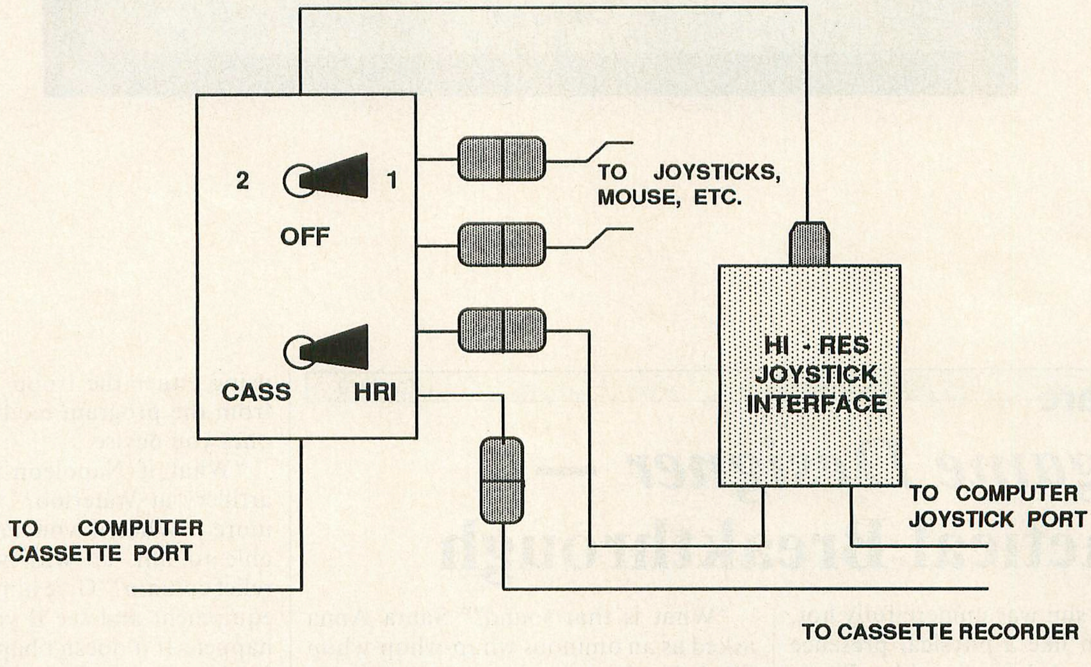


Match remaining wires from pins 1, 4 and 3 of J3, J4 and P2. Twist each group together. Solder and insulate with electrical tape or shrink tubing.

Figure 4: Cassette Port Connections


TO COMPUTER
JOYSTICK PORT
JOYSTICK
2
1
OFF
HI - RES
JOYSTICK
INTERFACE
MOUSE
CASS
HRI
TO CASSETTE RECORDER
TO COMPUTER
CASSETTE PORT

#1 - Switch between Hi-Res and regular positions for mouse and joystick. (Ex.: Use mouse for drawing tool, use joystick for games)

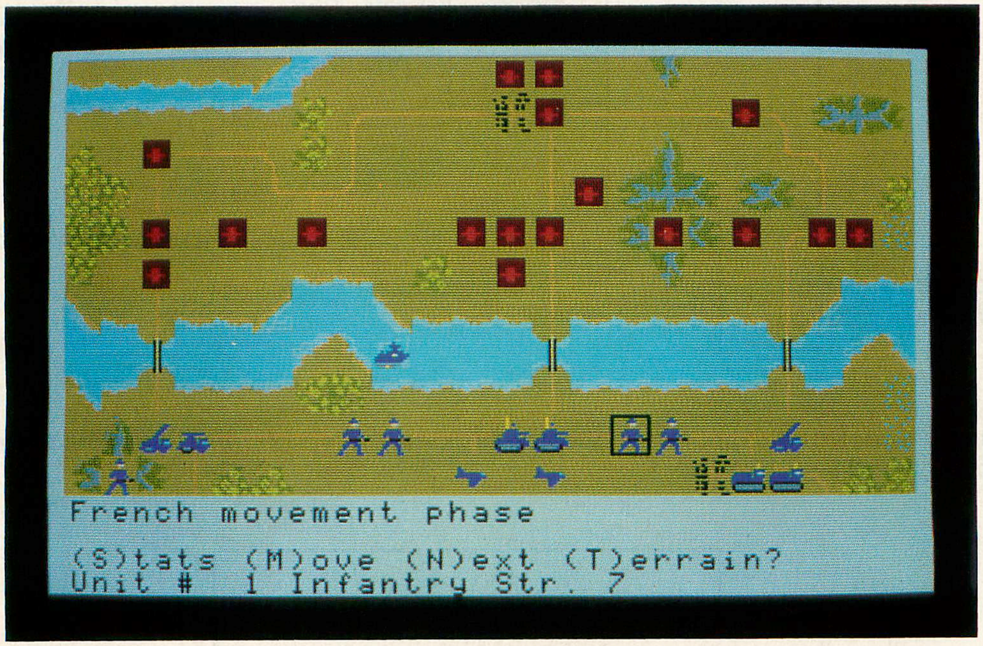

2
1
OFF
TO JOYSTICKS,
MOUSE, ETC.
CASS
HRI
HI - RES
JOYSTICK
INTERFACE
TO COMPUTER
JOYSTICK PORT
TO COMPUTER
CASSETTE PORT
TO CASSETTE RECORDER

# 2 - Use both devices for Hi-Res drawing. (Ex.: both mouse and joystick used for hi-res drawing tools)

Figure 5: Setup Diagrams

inside. As a finishing touch, cover the dry-transfer letters with clear nail polish to prevent them from rubbing off. To test it out, configure your Hi-Res Interface, cassette recorder and joysticks or other control devices as shown in Figure 5. Be sure to orient your accessories to match the marked switch positions. Now you can enjoy the convenience of switching both cassette and joystick ports without unplugging.

(Questions or comments about this hardware project may be directed to the author at 6835 Colleen Drive, Youngstown, OH 44512. Please enclose an SASE when writing for a reply.)



```
French movement phase
(S)tats (M)ove (N)ext (T)errain?
Unit #  1 Infantry Str. 7
```

Software CoCo 3

Wargame Designer — A Tactical Breakthrough

The Texas sun was unmercifully hot, beating down like a physical presence on attacker and defender alike. Santa Anna's troops looked across the open area leading to the Alamo and swore; it looked so simple and yet the dusty ground was littered with their comrades' bodies.

The defenders peered wearily over the Alamo's walls, knowing they could not withstand another attack. Powder and shot were low, casualties were high. A collective sigh of resignation arose as they saw the Mexican troops begin to move forward one more time, most likely the last.

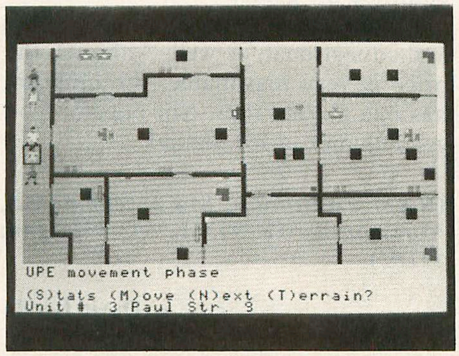
"What is that sound?" Santa Anna asked as an ominous whup-whup-whup filled the air, drowning out the thumping cannon and hissing rifle balls. His question was quickly answered as a troop of assault helicopters surged over the trees and began riddling his now-panicky troops with 2.75-inch rocket explosions and mini-gun bursts.

Science fiction? A movie with an exceptionally inept prop man? Every Texan's dream? Maybe. *Wargame Designer* from SPORTSware allows you to adjust the forces or terrain on the four provided scenarios, or design your own war game completely from scratch, using either the troop and map icons from the program modules or tailored ones you devise.

"What if Napoleon had had more artillery at Waterloo?" Give him some more. "What if von Paulus had been able to link up with von Manstein's relief column?" Give him the troops and equipment and see if you can make it happen. If it doesn't happen, subtract a Soviet corps or two and try it again.

You virtually have a free hand to design the war game you desire, adjusting the forces by type and strength as you like and drawing the map to suit your own ideas. As the rule book cautions, though, you should make the opposing forces relatively equal unless history demands otherwise; designing a game to commit slaughter is hardly fair, no matter what mission you remember.

This double-sided, two-disk set is designed specifically and only for the CoCo 3, using its 128K and advanced graphics capabilities to the fullest. The first question after loading is whether you have a composite or RGB monitor; the graphics look *ever* so much better on an RGB.



```
UPE movement phase

(S)tats (M)ove (N)ext (T)errain?
Unit #  3 Paul Str. 9
```

Since I have only a color TV, I wandered up to my local Radio Shack and asked to use one of their CoCo 3s hooked up to an RGB. Friendly and helpful people that they are, I was given free rein. Dave the salesman hung around to watch and was as impressed with the graphics as myself. While good enough on a TV set, they're truly spectacular on an RGB, and can be enhanced even further by the `PALETTE` command built into the system, allowing you to choose from among 64 colors.

The 23-page instruction/rule book comes in a folding plastic case along with two disks that are ready to be backed up. The instructions in fact suggest it. You'll have to do it anyway to design your own war games.

SPORTSware: Designer's Designers

SPORTSware, an 8-year-old, Toledo family-owned software company, stresses the word *strategy* in most of its products, being primarily interested in the strategic aspects of sports, science fiction, adventure and wars.

After designing a laserdisc football strategy game called *Live Action Football* (endorsed by the NFL) for arcades, they turned their talents to the CoCo. Their *Football Strategy* software was the arcade game without the laserdisc footage. Currently available software consists of *Gridiron Strategy* and *Weekly Winner* (for choosing lottery numbers), plus several separate war game scenarios not requiring *Wargame Designer* (*WGD*) to run.

Paul Olmstead programmed *WGD* specifically for the CoCo 3, inspired by its capabilities and some things he said he found unsatisfying about many current computerized war games: "Once you had played it through, there wasn't much else you could do with it; the graphics weren't appealing; many were for only one player and scenarios couldn't be changed." (He might also have added the lack of a game-saving option.) He stays with the CoCo 3 for the company's programs, feeling that every CoCo owner's secret desire is to own a CoCo 3.

A wargamer himself, Olmstead stated that he might have been one of the first people in the country to buy *Tactics* in 1964. Two years later, he was officially invited to participate in what has sometimes euphemistically been called the "Southeast Asia War Games." Instead, he enlisted, went to Officer Candidate School, served on the XVIII Airborne Corps' Commanding General's staff and found himself in Vietnam in 1968.

When asked about current projects, he obviously remembered his security clearance, responding, "We're not telling." Military and business experience taught him that you don't let the enemy or the competition know what you're doing until you've done it.

As a family businessman, Olmstead says that he relies a lot on his wife, Kathy, and daughter, Ashley, for support and understanding. The suspicion arises that the distaff side of the family may be the most severe and critical playtesters he has found. From my own experience, if I can get a new magic trick past my wife, it'll get by anybody.

SPORTSware encourages *WGD* owners to submit new scenarios for possible future use. Olmstead recently received a letter from a gentleman in Quebec who plans to create some additional *WGD* scenarios for his history classes and then share them with SPORTSware.

Considering the rampant imagination of CoCo owners, SPORTSware could become deluged with suggested battles, historical and speculative. Although nobody at the company has yet read *Red Storm Rising*, they might have to in order to understand some of the letters. ☐

War Games as History, or Vice Versa

Nobody knows for sure when commanders first began playing "What if?" games, trying to figure out what to do if their opponent did this or that. However, Wellington's remark "The Battle of Waterloo was won on the playing fields of Eton" could well have referred to a war game of some sort.

As weaponry becomes more precise and lethal, so must war games become more complex — which may explain why war games dealing with Napoleonic times may be the most popular: The weapons were sufficiently advanced to prevent all but the most inept commander from moving his forces in a single mass, yet uncomplicated enough to allow the rules to be relatively easy.

The first professional war game may have been *Kriegspiel*, developed by the Prussian general staff and perhaps partially responsible for their victory in the Franco-Prussian War. H.G. Wells (yes, that one) is credited with inventing the first war game for amateurs — *Little Wars*, which used model soldiers.

We've come a long way since then: Modern military services use computers and other exotic devices to simulate the forces opposing each other. Artillery, air strikes and the like are still important but are complicated by acronyms such as EMP, EW, FLOT, ECM, ECCM, ASW and ALOC. All of these Simulations are designed to train the staff, test the current plans and inject just the right amount of confusion and lack of information to make it seem real.

Bookshelves and toy stores are filled with war games ranging from Greek Hoplites to 21st century space marines, all for us amateurs. Many of them become quite confusing in their complexity caused by the quest for realism. Computerized games are much easier; the "commanders" make the decisions, the computer figures the results.

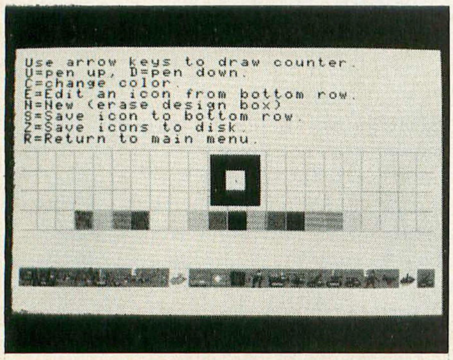
One vital point to remember, for both professional and amateur wargamers: Learn from the game and try not to repeat the dumb mistakes. A story has it that the Japanese naval staff war gamed an attack on Midway. The players portraying the Americans caught the other players while they were refueling and rearming their carrier planes, sinking two carriers. The chief umpire would have no part of that, since that might lead to an imperial defeat, and allowed only one carrier sunk.

A few years later, the same basic thing happened, this time for real. Many historians consider the Battle of Midway the turning point in the Pacific.

Did the U.S. Navy war game that one in advance? ☐

The system consists of five modules: unit icon design, map icon design, map design, unit attributes and the game module. The instructions walk you carefully through each of the first four modules, so it's almost impossible to mess it up if English is your primary language. However, when you design your own war game, make absolutely sure that you assign objectives for each army, man them and assign a Terrain Modifier of 8 to at least the Red army's town or fortress, even if you're re-enacting the Battle of Cannae as I was. Without objectives, the program checks to see if the Red forces occupy any objectives; finding none, it automatically declares the Blue forces the winner. This can be disconcerting when you've spent some time setting up the Order of Battle for each army and reviewed your notes on Hannibal. You can, by the way, design either one- or two-player war games; equally important is the capability to save a game in progress.

If you don't want to design your own from scratch, you can adjust various things on the four different games on the disks: Invasion North, Attack on Moscow, Robot Command and Dungeon Warrior. (These in themselves seem to be worth the price.) For example, you can change terrain features on the map, adjust movement points needed to cross terrain features, have reinforcements arrive earlier or later, and make a unit stronger or weaker. In addition, the entire thing is written in BASIC, so the hackers can play with that aspect also.



```
Use arrow keys to draw counter.
U=pen up, D=pen down.
C=change color.
E=Edit an icon from bottom row.
N=New (erase design box)
S=Save icon to bottom row.
Z=Save icons to disk.
R=Return to main menu.
```

My only suggestion would be to install a default value when assigning movement costs and combat modifiers; you could then use the cursor to take care of the exceptions.

The scenarios provided aren't that easy, either. After slashing my way through the border defenses in Attack on Moscow (and feeling pretty smug about it, too), my troops started getting fire from the Soviet Katyusha rocket launchers. This continued all the way to the Moscow suburbs, where my last bedraggled infantry unit perished under a rain of rockets.

The programs take up all but five granules on a disk, so you'll need to use a separate disk side for each game you design or modify. Difficult games can either be altered further or reformatted, backed up from the master copy and begun again. The only real limitation is your imagination.

In short, fanatical wargamers who have been waiting to fight some obscure battle from the War of the Roses don't have to wait any longer. Drag out the history books, lock and load a disk into your trusty CoCo 3 and have at it!

(SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, 419-389-1515; $29)

— John M. Hebert

Software CoCo 1, 2 & 3

Fraze Craze — Wheel-Watching on the CoCo

Fraze Craze, a fun-to-play word game similar to the popular *Wheel Of Fortune* TV game show, was written for the 64K CoCo 1 or 2 but also works on the CoCo 3.

Fraze Craze is supplied on an unprotected disk, so a backup copy for your own protection is not a problem. The program is written in BASIC, and the instruction booklet contains directions on adding your own custom game data covering people, places, things and events.

The right joystick is used to move the onscreen cursor left or right to select the letter of your choice. When you press the firebutton, the "spinner" is activated; a highlighted cursor moves from left to right across the screen and stops on a number. This number represents the dollar amount to be played on a particular turn and will be multiplied by the number of correct letters that show up when you make your guess.

Just like on the TV show, you can also buy vowels; but because the game is written for one player, you compete with five "men." If you choose a letter that is not in the phrase, you lose one man — you will also lose one man if the built-in timer counts down to zero before you select a letter.

Letters are blocked out after each choice, so you can keep track of the ones already used. As soon as you think you know the answer to the puzzle, you can select the question mark and then type in the answer. If you are correct, you win the round and go on to a new puzzle; otherwise, you lose two men and continue the game.

I liked *Fraze Craze*. It's fun to play and educational, as well. Although the price is very reasonable, the program has one glaring flaw. Not once do you get a chance to see Vanna!

(RAM Electronics, 814 Josephine St., Monmouth, OR 97361, 503-838-4144; $12.95)

— David Gerald

Software CoCo 1, 2 & 3

Hardware

Syntrax 2.0 — CoCo MIDI Package

There you are, a record producer, sweating bullets, surrounded by millions of dollars of electronic recording gear at a major recording studio. The equipment and musicians are costing you hundreds of dollars per hour. Your master tape must be mixed and ready to go tomorrow and the client is there breathing down your back and even more nervous than you are. (No wonder. By the time it's all done, you may have spent over $25,000 of the client's money recording the album!)

Suppose, in the middle of the session, I stopped you and said, "Hold on. Relax. I can get you the same quality product for the cost of a CoCo, a few synthesizers and *Syntrax* 2.0 from Intercomp Sound. You'll save hours in costly studio time, and have more control at every step of the production."

You'd probably make an appointment with me first thing the next morning, wouldn't you?

I know just what I'm talking about, because I have had my own copy of *Syntrax* for a couple of years, and it has already saved me thousands of dollars in recording costs. (I am a pianist/synthesist/producer and have just finished producing one album in Nashville. I own five synthesizers, two MIDI-capable digital reverberation units, a drum machine and — of course — several CoCos.)

If you don't know what a MIDI synthesizer is, here is a brief explanation. (For more details, go to your local *professional* music store and ask for a demonstration of MIDI.)

MIDI is short for Musical Instrument Digital Interface and refers to a standard format for data transfer between electronic synthesizers. The data includes information such as how quickly a key on a synth was depressed, which note it was, how long it was held down, and so on.

MIDI's capability to quickly transmit the status of electronic devices (of which synths are only one example) is making it a de facto standard for the electronics-dependent recording industry. MIDI is such a developed protocol that it allows the musical imagination to go into territory unimagined just a few years ago.

Syntrax arrives with a thick manual and software. However, it requires the Color MIDI Connection, a hardware MIDI interface that connects between the computer and the disk controller. An extender ribbon connector is part of the interface, so I recommend a Multi-Pak to reduce those occasional I/O errors.

You install *Syntrax* by turning off your system and attaching the Color MIDI Connection. Then you attach your MIDI cables from the CMC to your synth, power up and type `RUN "SYNTRAX"`.

The Channel mode prompt (`CH>`) flashes, waiting for commands; a sophisticated parsing routine interprets them. All available commands are presented onscreen.

Let's run through a sample session. Suppose we want to create a music file with the built-in editor. This uses the Insert mode, so we press I.

The screen clears, leaving us with the Channel mode prompt and a line number. At the cursor we type our musical data in letter form. Using the usual RS-DOS SHIFT-0 combination as necessary, we enter the following: `CH> 1 c:d:e:f:g:a:b:C:D:E:F:G:A:B`. This is two octaves of a C major scale.

Why do we mix uppercase and lowercase? *Syntrax* starts out with a default two-octave range, with the lower octave being represented by CoCo lowercase (reverse video) letters, and the upper octave with uppercase. Also, the default note duration is a quarter note. Notes are separated by a colon.

When you press ENTER, *Syntrax* compiles your text into MIDI data (compilation is incredibly fast), and you are brought automatically to the Play menu. Begin to play the line above by pressing B for Begin, and *voila*! Your MIDI keyboard plays what you typed! To continue with the rest of a composition, you simply add more text lines with the editor, compile them, and play them back to check them one at a time.

That was easy. What else is there? Flats and sharps are handled easily. Simply use the plus sign (+) for sharps and the minus sign or hypen (-) for flats. One way to write an E-flat major scale would be `CH> 1 e-:f:g:a-:b-:C:D:E-`. The notation may seem hard to master, but it isn't — I got accustomed to the system in minutes.

Chords are easy, too. For a C major chord (which has the notes C, E and G), simply type `CH> 1 cmaj`. And for minor, type `cmin`. Diminished chords and chords with sevenths are implemented, too.

You can also specify each note in a chord, for that special voicing or for that "weird" sound not covered by usual chord notation. To make the notes sound simultaneously, don't separate

NEW FROM RTB SOFTWARE

Graphic Adventure Games
Adventure Trilogy But Each Is
A Stand Alone Game

LABYRINTH

Can you escape and save your kingdom?

QUEST
FOR THE RING

Wander your vast kingdom in search of the Wizards Ring. But beware!

ADVENTURE IN LUMERIA

After resting from the last 2 adventures you go on the last and final quest to save a beautiful princess from an evil count in the far off land of Lumeria.

All games may be backed up and use simple keystroke commands. All for 64K ECB Disk COCO 1 or 2.
LABYRINTH $24.95 1 Disk
Quest for the Ring ~~$46.95~~ Now $34.95 2 Disk Set
Adventure in Lumeria ~~$48.95~~ Now $36.95 2 Disk Set
or get all 3 games for $74.95 Add $3.00 for S&H

Send check or Money Order to:
RTB Software
P.O. Box 777
W. Acton, MA 01720-0011

Phone # (508) 263-0563
All programs are guaranteed to load and run

4-TECHS presents
Arcade Feeling at Last

J.A.C. Joystick Alternative Controller
With Rapid Fire Control !

Use ATARI type joysticks with your CoCo. JAC comes with our unique rapid fire control switch, GREAT for Pegasus & Zaxxon. Works with majority of joystick controlled games.
New from 4-TECHS
Introductory Price $22.50

4-TECHS 4-TECHS 4-TECHS 4-TECHS 4-TECHS

S.T.O.P. Save Time On Pause.

CoCo users, now Pause any program at the touch of a button, then resume when you're ready. NOW ONLY! $14.95

$2.50 P/H COVERS ENTIRE ORDER

4 TECHS
P.O.Box 2575
Merrifield, VA 22116

PLEASE ALLOW 4-6 WKS DELIVERY

them with colons: `CH> 1 d e- g- b- F.`

Duration of the notes can be manipulated, too. Here is a funk bass line in *Syntrax* notation:

```
CH> 1 ? r/16:d-:e-:r/8:d-
/16:r:e-:r:d-:e-/8:c--
```

Rests are denoted by `r` and the duration of a note is specified by a slash followed by the duration required. In the example above, `r/16` means a 16th-note rest, `e-/8` means an E-flat in the bass clef for an eighth note duration. If no duration is specified, the previous duration is implied.

Several lines of this kind of text, when listed to the screen or printer, can be difficult to interpret months (even hours) later. Luckily, *Syntrax* allows you to fully comment your data. Simply type in a line of music, type a semicolon to signal that what follows is a comment, and then enter your comment. For example:

```
CH> 1 & D-maj E-/1:E-maj
F/1; Rhodes chords, measures 1
and two
```

The compiling step, initiated with ENTER, will ignore all text followed by the semicolon. Note that the question mark (?) and the ampersand (&) denote bass and treble clef, respectively.

Other features of *Syntrax* Channel mode insertion include transposing by any number of half-steps; sending out specific MIDI bytes such as program change, attack velocity, pitch-bend, and MIDI channel data; easy implementation of repeats, even with nested repeats; memory conservation by chaining to other files.

After you have entered a file, you will want to hear it. Go to the Play menu (from the main menu), where you can choose to begin playing (B), to stop play in the middle (S) or to continue playing (C). You can fast forward with the clever view feature (V) and you can interactively change the tempo during playback with the tempo option (T).

Is that all for the Play menu? Hardly.

Play's "More" option (M) brings up a whole new screen, which allows you to do the following: choose your synchronization source, either the computer itself or an external sync device, such as another sequencer or a drum machine; send out a MIDI "tune" command to all your synths to make sure they all tune their internal oscillators, a great feature for initializing an extensive MIDI setup "at the gig"; select your clock resolution (24, 48 or 96 pulses per quarter note); choose to display note names as the sequence is playing; "mute" (de-select) any of the Channel files you have created (essential for recording studio applications).

The Channel files you create are combined to play simultaneously. But when I go into the studio, I don't want all the files to play at once. I typically record my music one track at a time with only one synth, so I need to mute all parts but the one I am currently recording.

Are you starting to get the feeling that *Syntrax* 2.0 is feature-packed? Believe me, it is.

In addition to the Channel mode, *Syntrax* offers System mode. You change to System mode after saving your Channel mode files to disk (which *Syntrax* reminds you to do with an "Are You Sure?" message).

In System mode, you assemble individual Channel mode files into a System mode file. This System mode file specifies the Channel mode files you want to include, determines the tempo and any tempo changes within the song if necessary (called "Global Track"), and provides access to a Play menu similar to that available in Channel mode.

In addition to using the Channel mode editor to input notes, *Syntrax* offers two more input methods, Step-Time Recording and Real-Time Recording.

Step-Time Recording allows the user to hook up his or her MIDI-equipped synth to the MIDI-In port of the Color MIDI Connection and insert (I) notes from the synth keyboard instead of

star
micronics
MULTI-FONT PRINTER
NX-1000
NEW

7 Color Printer NX-1000 RAINBOW

The NX-1000 gives you plenty of print options for attractive printing. Four typestyles. Four pitch sizes, in standard and italics for a total of 32 NLQ modes. The NX-1000 Rainbow gives you all these features plus online access to 7 color printing and graphics. Black, blue, red, yellow, green, violet, and orange. Both models have a 1 year warranty, nationwide service and a 30 day online trial.

NX-1000 SPECS: 144 cps Draft, 36 cps NLQ (18 x 23 dot matrix), 4 NLQ Fonts, Italics, Sub & Superscripts, Emphasized, Doublestrike, Proportional, Condensed, International, Downloadable, Quad Tall, Double Tall, Underline, 9+ Pitchs, Forward and Reverse n/216" Line Feeds, Absolute or Relative Vert. & Horz. Tabs, Left, Center or Right Justification, 8 Graphics Modes to 1920 dpl, Macro Instruction, Bidirection, Adjustable Tractor Feed, 200+ Printable Characters, Semi Auto Sheet Feed, Front Panel Soft Touch Control, Epson and IBM Emulate, 4k Data Buffer, Hex Dump. Rainbow: Same plus color.

NX-1000 SYSTEM INCLUDES:
- Star NX-1000 Printer
- Blue Streak Ultima
- Software Support Trio

$199.95
+$10 Shipping and Insurance
COMPLETE

NX-1000 RAINBOW SYSTEM INCLUDES:
- Star NX-1000 Colour Printer
- Blue Streak Ultima
- Software Trio
- Color Super Gemprint

$288.95
+$10 Shipping and Insurance
COMPLETE

Software Support Trio

TYPE SELECTION/ TUTORIAL
Online instructional program that will select 24 special features of your printer or display methods to incorporate them into your programs.

SUPER GEMPRINT
Will transfer a Pmode 0, 1, 2, 3, or 4 picture screen to printer 8"x11" hardcopy. Black/white, white/black or grey level shading for color.

HI-RES SUPER GEMPRINT
Disk software that will transfer a Hscreen 1,2,3 or 4 picture screen to printer. Grey level shading for color.

Software Trio
$19.95
FREE
with purchase of any NX-1000 Printer

Price, availability and specifications subject to change without notice.

DAYTON ASSOCIATES of W.R. HALL, INC.
7201 CLAIRCREST, BLDG. D
DAYTON, OHIO 45424
OHIO RESIDENTS ADD 6% SALES TAX • C.O.D. ADD $2.00

PERSONAL SERVICE
(513) 236-1454
Visa & MasterCard
within the continental U.S.

from the CoCo keyboard. First, tell *Syntrax* that your synth is on from the main menu. Next, choose Insert. Instead of being brought to the Channel mode editor, you are now in a new screen full of a host of new options. Just start playing, and your notes will go into the buffer. Durations are not recorded, but are easily added by tapping the space bar.

Step-Time Recording mode offers several crucial editing functions, which may either be activated by the CoCo or assigned to several "spare" notes of your synth keyboard. Activating editing from your synth allows you to spend less time going back and forth between synth and CoCo.

Step-Time Recording provides the ability to do the following:

- alter note durations
- loop playback so you can hear your sequence over and over
- enable and disable triplet note duration
- interactively change playback tempo
- fast-forward and rewind through your sequence
- switch over to Real-Time Recording.

Real-Time Recording is the final input mode offered by *Syntrax* and is particularly useful for more capable keyboard players. Real-Time Recording records notes *and* their durations.

Let's take a quick look. Real-Time Recording provides a great built-in metronome and quantization. Quantization is like the grade-school process of rounding off fractions to whole numbers, except you are rounding off your sloppy playing to the nearest 16th note or eighth note, or whatever unit you need to clean up the slop.

A song-position pointer is also implemented. MIDI pros will be glad for this, as SPP allows the CoCo and a drum machine to keep tabs on each other's place in a composition.

This is only an overview of the structure and sense of operation of *Syntrax*. There are dozens more features, including some not documented (like MIDI delay and track-shifting for that really relaxed drum feel) and some rather esoteric (like telecommunicating sequences and controlling light rigs with MIDI signals).

It might be best to conclude with my overall impression of the product from the professional point of view.

Syntrax provides an easy way to get at the "byte level" of MIDI data. It is so memory-efficient that I will eat my hat if you can compose a piece with it and use up the memory. The drum machine interface is the most reliable of any MIDI program for the CoCo. The manual is complete. *Syntrax* is fairly easy to learn; the more you know about music, the better. It has never failed me in the studio.

Syntrax, for now, is my MIDI sequencer of choice for the Color Computer. However, it lacks chiefly in two areas.

One, the user interface, while well-designed, has problems. Channel mode is somewhat like programming in BASIC at times. Input from the Real-Time mode needs the ability to record polyphonically. And the program *never* shows a musical staff. This is enough to make educators balk at using this otherwise powerful tool. Many musicians, too, would rather see a staff than be caught dead learning "programming."

Two, the manual — which comes well-bound and professional-looking — does not read as professionally as the program operates. It is largely complete, but not entirely clear and contains a few grammatical errors.

But these are small criticisms. The manual is improving with each revision, and there are other enhancements, too, including changes to the Color MIDI Connection that make it safer to add and remove MIDI cables while powered up.

Syntrax 2.0 provides features not found in many — if not most — other MIDI software packages. (In fact, I know no other RS-DOS program of *any* kind that offers more features.) And I hear the folks at Intercomp Sound are

The Ultimate Serial to Parallel Converter!

7 Switchable Baud Rates
300 • 600 • 1200 • 2400 • 4800 • 9600 • 19200

Use this "smart" cable to connect a Centronics parallel printer to any version CoCo or use it to improve performance of your current printer.
Try it on your system for 30 days RISK FREE. One year warranty. Dealer inquiries on quantity 3+.

$39.95 +$2 Shipping

4800
9600
19200
2400
1200
600
300
BLUE STREAK
ULTIMA
SERIAL TO PARALLEL INTERFACE

Color Super Gemprint

Print your Graphics Screens in Color on your NX-1000 Rainbow

Color Screen Dump Software

Use your favorite program to create a pmode or hi-res graphic image, but don't stop there! Run our color graphics software and print a color image using a pallette of 81+ colors on your NX-1000 Rainbow from a CoCo 1, 2, or 3. This system superimposes 4 graphic screen dumps (black, blue, yellow & red). The colors mix and add to give you your own color masterpiece.

System Requirements: 32k ECB Disk, Blue Streak 1, 2, 3 or Ultima

$19.95

FREE with purchase of NX-1000 Rainbow Printer

Price, specifications subject to change without notice.

DAYTON ASSOCIATES of W.R. HALL, INC.
7201 CLAIRCREST, BLDG. D
DAYTON, OHIO 45424
OHIO RESIDENTS ADD 6% SALES TAX • C.O.D. ADD $2.00

PERSONAL SERVICE
(513) 236-1454
Visa & MasterCard
within the continental U.S.

working on a CoCo 3 version that will knock our socks off.

All in all, I would say that *Syntrax 2.0* is the one to buy if you plan on getting into professional performance and recording. If you have a CoCo 3, however, I suggest you wait until the guys at Intercomp get the new *Syntrax* out.

(Intercomp Sound, 129 Loyalist Ave., Rochester, NY 14624, 716-247-8056; *Syntrax*, $95; Color MIDI Connection, $98: First product review for this company appearing in THE RAINBOW.)

— Paul Ward

Software

Flight Simulator II — Realistic Flight Simulator for the CoCo 3

If you enjoy flying, either as pilot or passenger, you will like this entry into the CoCo 3 market from SubLOGIC Corporation — *Flight Simulator II*, or *CC-FS2*, which simulates the instruments and flight characteristics of a Piper P-28-181 Archer II.

The program, written in OS-9 Level II, boots using the familiar `DOS` command with RS-DOS 2.1 or later. If you have an earlier version of RS-DOS, a short program is provided in the documentation to allow you to boot the program from BASIC.

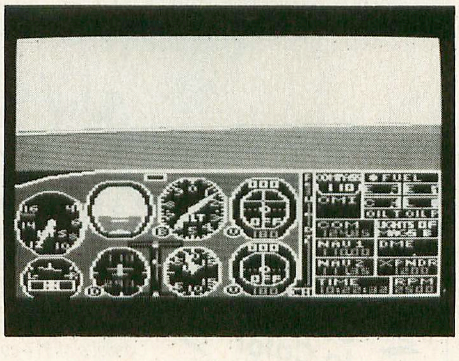
The Piper Archer II is a single-engine, 148 mph, non-retractable gear aircraft equipped with a good set of avionics. The author chose to simulate the Archer II because of its overall good performance, simplicity and ease of flying.

This simulator is well-packaged and is sure to catch your eye on your dealer's shelf. The package consists of a single non-protected disk and flight maps of the Los Angeles, Chicago, New York, Boston and Seattle areas. Also included are two soft-cover books: *Pilot's Operating Handbook and Airplane Flight Manual*, which will help you figure out how to fly the simulator; and *Flight Physics & Aircraft Control*, a 92-page, informative mini-manual that explains the dynamics of flight and aircraft control. Inside *Pilot's Operating Handbook* is a handy "Flight Reference Card" that shows at a glance the keys that control the aircraft's elevators, throttle, trim, rudder and brakes. It also provides information on selecting views out of the cabin window. You will find yourself using this card frequently.

Although the graphics look best on an RGB monitor, provisions are made to run the program on both composite monitors and TV sets. I used the keyboard to control the program, although joysticks can be used. The *CC-FS2* disk contains a war game and several scenery files for the Chicago, Los Angeles, New York and Seattle areas.

A "Quick Test-Flight" mode is available and will allow you to start flying as soon as you boot the program. I preferred to watch the demo mode for a while to get a feel for what was out there and to see the controls operating. The screen is split horizontally. The top part of the screen displays what you, the pilot, see when you look out the window. This view is adjustable for side, back and forward views.

The bottom part of the screen displays the instrument panel, which is really "loaded." Space does not allow me to detail each and every control, knob, indicator, etc. But suffice it to say that the panel is jam-packed with such items as an airspeed indicator, altitude indicator (horizon), altimeter, heading, trim, stall warning, elevator, rudder and flap position. Also monitored is oil pressure, fuel, the magneto, COM and NAV radios, tachometer, carb heat, omni bearing, course deviation and glide slope.



One or two joysticks can be used to control flight. The left joystick controls the aileron in the left-right direction and the elevator in the forward-back direction. The button is used to select the cabin view. The right joystick, if used, controls the flaps in the left-right direction and the throttle in the forward-back direction. The right joystick button controls the brakes while on the ground and guns while in the War Game mode. If you don't have joysticks or don't want to use them, you can still fly with *CC-FS2*.

Clusters of keys on the CoCo's keyboard are used for the various phases of flight control. For example, the ailerons are controlled with the F, G and H keys, representing the left, center and right ailerons. The elevators are controlled with the T key (down) and the B key (up). Elevator trim and flaps are similarly controlled. The rudder moves from left to right using the C and M keys, and your brakes are activated by the space bar.

Although *CC-FS2* is easy to fly, I found the hard part to be in the landing. In fact, flying was all I accomplished during this review. After several crashes, I concluded that I wasn't cut out to be a pilot anyway. I was able to "buzz" the Sears Tower in Chicago a couple of times. The realism is really apparent to you when you fly low and change the view out the window as you pass buildings, mountains, etc. The colors are great, but the motion, while a little jerky, is no worse than that found on the IBM version of *Flight Simulator*. In fact, the program looks a whole lot like the IBM product to me.

The author of the program, Bruce Artwick, has done an excellent job in adding realism to *CC-FS2*. Everything from cloud formations, night flying (dark outside with instrument lights only) and wind are user-controlled from a setup screen activated by the F1 key. You can even fly on instruments if you are so inclined.

The War Game option is a lot of fun, too. You will see the gun site in front of you as you take off and declare war on the enemy. Be prepared for some dogfighting fun as you shoot your dual machine guns and drop bombs on enemy territory.

Flight Simulator II is a fine program for the CoCo 3. Not only does it provide some serious diversion from the usual game fare, but it challenges and educates, as well. I recommend *CC-FS2* for your CoCo 3. Whether you are a pilot or just interested in flying, *CC-FS2* will give you the chance to fly without suffering some serious consequences.

(SubLOGIC Corporation, 713 Edgebrook Drive, Champaign, IL 61820, 217-359-8482; $24.95: Available in Radio Shack stores nationwide.)

— Jerry Semones

Software

CoCo 1, 2 & 3

Mini Database — A 32K Database for Little Lists

While more and more of what I consider "serious software" is becoming available for our powerful Color Computer, I am glad to see companies bringing out good productive software for those people and purposes that do not require complicated and expensive software. *Mini Database* by Tothian Software is such a program. It is not a large and full-featured database program, yet that is not what it is supposed to be. It is what its name implies — a 32K mini database. It will handle a lot of the jobs most people use an expensive database for, and it does it very well.

If you have jobs that honestly do not require the special abilities of an expensive database program, but do require some data manipulation, you may be looking for a program just like *Mini Database*. It allows you to create files for friends or club members, addresses, phone numbers, home inventory, maintenance schedules, collections, etc.

Mini Database is available on both disk and cassette. If you purchase the tape version, you'll still be able to use the program when you upgrade to disk. The program is written in BASIC, which gives it some distinct advantages.

Once the program is loaded and run you are guided by very simple menus. The program is very user-friendly, but it is not "idiot proof." Being written in BASIC helps, though. For example, you can accidentally exit the program without saving your data (there is no "Are you sure?" feature), but this is no problem in BASIC — all of your data is still in memory; just typing `GOTO 7000` gets you back to the main menu with all your data intact. If you accidentally press the BREAK key, typing `CONT` or the `GOTO` statement will get you to the main menu.

The program does not check for memory area. If you try to create a database too large, you will get an OM Error. This just means you will have to create a number of smaller databases or revise the original. I am not pointing these things out because I think they are problems, I am pointing them out because they are easy to get around with a little thinking. Being written in BASIC makes the program easy to recover from mistakes.

BASIC also makes *Mini Database* compatible with all three CoCos. I am very impressed with a company that keeps coming out with inexpensive, easily expandable software the average CoCo owner can buy for small jobs. Do people really *need* a database program that is going to run anywhere from $80 to $250 just to keep track of club mailing lists? I believe there is a lot of work out there that can be done very well with smaller, less complicated programs. You may even find *Mini Database* a whole lot easier to use than the expensive database programs that do all those things you don't really care about, anyway.

(Tothian Software Inc., Box 663 Rimersburg, PA 16248; $14.95)

— Dale Shell

Software

CoCo 3

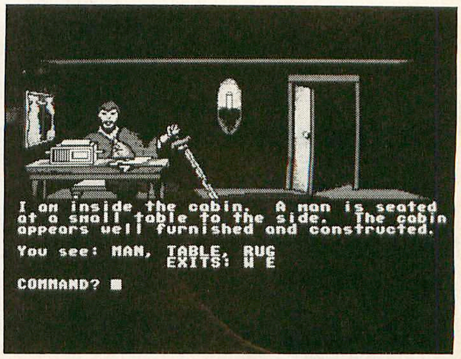
In Quest of the Star Lord — Seeking the Phoenix Crossbow

As the son of an internationally famous scientist, you have been imprisoned in a research work camp following a 12-year interworld war. Your father, who was killed during the war, had provided you with a scientific education and a bright future. In your research you come across passages referring to the prewar empire of the Star Lord and his ultimate weapon — the Phoenix Crossbow. You decide to escape from your prison and search for the Phoenix Crossbow. You know that if you find it, your freedom will be ensured forever.

In Quest of the Star Lord is an animated action Adventure written for the CoCo 3 and one disk drive. The package includes two flippy disks so that the Adventure will fit on two disks rather than four. The graphics are superior and without a doubt the best I've seen to date on the CoCo 3; the 320-by-200 resolution is razor-sharp on my Tandy CM-8 RGB monitor. The program works on composite color monitors and TV sets, as well.

The program is copy-protected and warranted for one year, and will be replaced during that period free of charge if needed.

Starting the Adventure is as simple as typing `LOADM "BOOT"` and pressing ENTER. After selecting monitor type, a colorful and rather dramatic title screen appears, complete with flashing lightning and a musical interlude.



```
I am inside the cabin.  A man is seated
at a small table to the side.  The cabin
appears well furnished and constructed.
You see: MAN, TABLE, RUG
              EXITS: W E
COMMAND? ■
```

The program responds to standard two-word commands at the prompt. These commands must consist of a verb followed by a noun — `GET ROCK`, for example. Abbreviations are also accepted, such as `I` instead of `INVENTORY`. Also, as is customary, direction is controlled by commands such as `GO NORTH`, or simply `N`. If you are serious about solving this Adventure, it's wise to make a map of your travels.

The ability to save your progress is provided so that you don't have to keep repeating each command as you move on to different locations and screens. Simply typing `SAVE` and pressing ENTER provides a prompt that allows you to save your last six attempts.

I found *In Quest of the Star Lord* extremely challenging and fun to play. Whenever I get a chance to review graphics Adventure games, my 11-year-old daughter sits for hours fascinated with the endless possibilities and often surprising results. The two of us working together have made a lot of progress in this Adventure, but at the time of this writing have not even come close to the solution. As with most Adventures, part of the fun is trying to figure out the right commands. We found that while seemingly simple commands are often appropriate, it sometimes takes a while to come up with them.

The animation often manifests itself in the form of moving cloud formations, lightning and flashing lights. The use of shadows provides a realistic and often striking effect — you have to see it to believe it is being generated on your little old CoCo 3.

In my opinion, *In Quest of the Star Lord* is quite simply a dynamite program. It's not a fast-paced game by any stretch of the imagination, but rather a strategy-filled exercise sure to provide hours of excitement and enjoyment.

(Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, 412-372-5674; $34.95 plus $2.50 S/H)

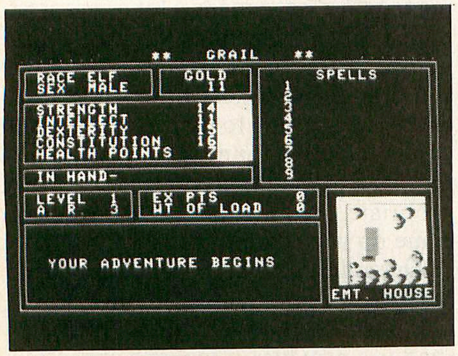
— Robert Gray

Software CoCo 3

Power Stones of Ard — The Quest for the Spirit Stone

The popular "dungeons and dragons" type games lend themselves particularly well to the computer. And since the first home computers began to gain in popularity, this type of game has amassed a large and loyal following. Three C's *Power Stones of Ard* now brings the challenge of swords and sorcery to CoCo 3 users.

Millenia ago, when the forces of Good and Evil battled each other for control of the world, three magical stones were created. Among them, they contained all the magic and power of the forces of Good. Alas, they were stolen by the Evil Ones, and now each is protected in a separate fortified stronghold — tempting treasure for a resourceful Adventurer. This is where you come in! You must try to find that particular stone called the "Spirit Stone" and take it away from the Evil Ones. . . .



```
            **   GRAIL   **
RACE ELF        GOLD          SPELLS
SEX  MALE        11         1
                            2
STRENGTH         14         3
INTELLECT        11         4
DEXTERITY        15         5
CONSTITUTION     16         6
HEALTH POINTS     7         7
                            8
IN HAND-                    9

LEVEL  1   EX PTS       0
A. R.  3   WT OF LOAD   0

  YOUR ADVENTURE BEGINS
                                EMT. HOUSE
```

Bill Cleveland, the program's author, has created an attractive screen to display all the necessary status reports (wealth, character information, etc.) for game play. The lower-right section of the screen is used for scrolling graphics scenes, featuring overhead views of the traveler's locale; these are attractively done and well-executed.

At start-up, the user can elect to create a character, load a previously created one or opt to use the default character. The traits of strength, intellect, dexterity and constitution are user-definable. Based on the character selected, the computer then generates starting amounts of gold and health points (necessary for success).

Most commands are performed by a single key press. Movement about the world is accomplished by use of the arrow keys. Other examples are <A>ttack, <B>uy, <G>et, etc. Use of the CTRL key and function keys is supported.

I found the game both fun and challenging enough to provide hours of entertainment. The program comes on a single unprotected disk for user convenience. A booklet contains loading instructions, documentation for all commands and a handy quick-reference guide. Another plus for the program is price. *Power Stones of Ard* should find its way into many CoCo 3 software collections.

(Three C's Projects, P.O. Box 1323, Hamlet, NC 28345, 919-582-5121; $18)

— Leonard Hyre

Software CoCo 3

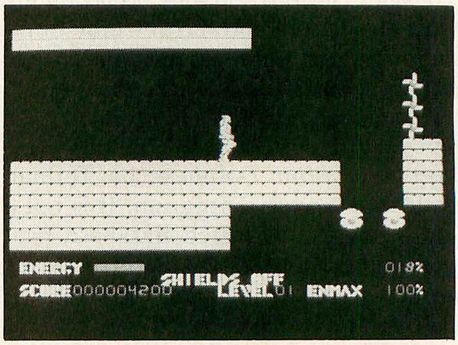
Thexder — From the Folks Who Brought You GoBots

Americans seem to have a love affair with things "Made in Japan." Toyota cars arrive by the boatload; Noritake dinnerware graces the table of many a U.S. household; Panasonic consumer electronics of all kinds are sold in ever-increasing numbers. Americans are even developing a taste for thinly sliced raw fish served on rice.

With the exception of the *sashimi*, these products have earned their niche in the marketplace due to their high quality and reasonable prices.

Now another Japanese import is claiming our attention — *Thexder* has arrived. What is *Thexder*? Well, it's a "robot" that comes to you via the very American computer company in Coarsegold, California — Sierra On-Line.

The *Thexder* "Super Assault Vehicle" is supplied on a ROM pack and comes alive with a little help from your CoCo 3. In the game, you are the pilot of the *Thexder* Super Assault Vehicle. Your mission is to destroy the central computer, which creates evil creatures and turns them loose on the world.



As you proceed, you are faced with various challenges. There are more than 20 types of aliens to do battle with, and the game gets more difficult the further you advance. Caves, vast cargo holds and spaceship interiors are all turned into battlefields.

A variety of armament and shields are available to assist *Thexder*, including a very unique ability — *Thexder* can change from a robot to a jet fighter. Yes, just like on the *GoBot* TV show, you can "transform" back and forth at the touch of a button.

Unlike simpler arcade games, *Thexder* uses multiple screens, music and excellent animation. Shields, differing energy levels, hidden traps and a seemingly endless variety of scenarios all combine to make this a game you will be drawn to. Like the more familiar Sierra Adventure-type games, *Thexder* gives you a lot of play time for your money.

How good is *Thexder*? Well, it's the best-selling arcade game in Japan. Over 500,000 units have been sold there. While arcade games are passé here, the fury continues in Japan. To be the best in Japan, an arcade game has to be very good. And *Thexder* is!

Thexder sends you on a perilous journey. But if you have a CoCo 3, it's quite a trip.

(Sierra On-Line, Inc., Coarsegold, CA 93614; $24.95: Available in Radio Shack stores nationwide.)

— Bruce Rothermel

Hardware CoCo 1, 2 & 3

RS-232 Switcher — Making the Connections

A new vendor in the CoCo market, Radcomp is making its presence known by offering quality construction at a very reasonable price.

The product in question is an RS-232 switch. While the unit I received was of the two-position variety, a more useful three-position switch is also available. Both switches are offered for retail sale at approximately one-third the usual cost for such devices.

A top-mounted two- or three-position rotary switch indicates which port is currently active. Input is via a standard male CoCo four-pin serial connector attached to a 2-foot length of cable. Two (or three) female serial outputs, which are mounted along the 4-inch length of the case, complete the assembly. Overall finish and construction are excellent, and the unit should provide reliable, trouble-free service.

If you are an old hand at plumbing countless devices into your CoCo, no doubt you already own one, if not several, RS-232 switching devices. On the other hand, if you are new to the world of CoCo computing, you will very soon encounter the need for multiple RS-232 connections. While a switching device can't provide you with multiple active inputs, it does away with the never-ending cable swapping that accompanies the single-port, multiple accessory setup that most of us eventually construct.

Incredibly, this simple product is accompanied by four pages of installation instruction, and includes several paragraphs on hints and operation — all this for a simple switch. While I feel that documentation is absolutely essential, this effort probably constitutes a bit of overkill.

Radcomp obviously has our best interests at heart, as evidenced by a 30-day, money-back guarantee and the inclusion of a lifetime warranty on their products, and that commitment is acknowledged. But I would suggest the people at Radcomp retain a bit more profit from their enterprise by curtailing (excessive) printing expenses and devote the difference to additional product offerings. The CoCo Community always welcomes quality. Welcome aboard, Radcomp!

(Radcomp Computers, 1865 E. Broadway #420, Tempe, AZ 85282, 602-894-6489; two-way Switcher, $10; three-way Switcher, $11.50: First product review for this company appearing in THE RAINBOW.)

— Henry Holzgrefe

SPECIAL DEAL ON 500 PROGRAMS IS BACK!

BACK BY POPULAR DEMAND! GET OUR LATEST 50 DISKS OR TAPES FULL OF OVER 500 PROGRAMS. HERE IS WHAT YOU'LL RECEIVE:

★Over 250 Utility/Home Application Programs including a Word Processor, Database, Spreadsheet, Disk Utilities, Business Software, Electronics Series, Educational Programs for Kids, plus much more!

★Over 200 exciting games including King Pede, Kron, Star Trek, Flight Simulator, Wizard, Horse Races, Football, plus much more.

★Over 30 adventures including Rambo, Haunted House, Power Sword, Skid Row, plus 32k graphic adventures.

Individual issues sell for $9⁰⁰ each or $450⁰⁰ for all 50. We slashed the price to only $150⁰⁰!

REG. $450 NOW $150⁰⁰

★★THIS MONTH ONLY★★

Buy this package of 500 programs and receive a free 6 month subscription.

VISA

RAINBOW CERTIFICATION SEAL

COOL DOWN TO OUR SUMMER PRICES ON SUBSCRIPTION SOFTWARE

THERE IS NO BETTER WAY TO ENJOY THE SUMMER THAN TREATING YOUR COLOR COMPUTER TO 10 READY-TO-RUN PROGRAMS EACH MONTH. GET 12 DISKS OR TAPES A YEAR CONTAINING OVER 120 QUALITY PROGRAMS. A SUBSCRIPTION TO T & D SOFTWARE CONSISTS OF 10 READY-TO-LOAD PROGRAMS DELIVERED BY FIRST CLASS MAIL EVERY MONTH.

NO, WE ARE NOT THE SAME AS THE RAINBOW ON TAPE. IN FACT, MANY SUBSCRIBERS HAVE WRITTEN IN AND SAID THAT WE ARE MUCH BETTER THAN RAINBOW ON TAPE!

PRICES

	TAPE OR DISK	THIS MONTH ONLY
1 YEAR (12 issues)	~~70.00~~	60.00
6 MO. (6 issues)	~~40.00~~	35.00
1 ISSUE	~~9.00~~	8.00

Michigan Residents Add 4%
Overseas Add $10 to Subscription Price
Personal Checks Welcome!

★ Available on COCO 1, 2, and 3
★ Includes Documentation
★ Over 4,500 Satisfied Customers
★ Back Issues Available From July '82 (Over 720 Programs)

TURN TO PAGE 30 & 31 FOR A COMPLETE LISTING

PLEASE SPECIFY TAPE OR DISK

MasterCard

T & D SUBSCRIPTION SOFTWARE, 2490 MILES STANDISH DR., HOLLAND, MI 49424 (616) 399-9648

Received and Certified

RAINBOW CERTIFICATION SEAL

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

EZGen, a disk-based boot editor for OS-9 that allows OS-9 programmers to edit OS-9 modules or data blocks contained in a specified file. For all CoCos and OS-9 Level I or II; 512K required on the CoCo 3 for OS-9 Level II. *Burke & Burke, P.O. Box 1283, Palatine, IL 60078, 312-397-2898; $19.95.*

◆ **Home Bingo**, a program that lets you play bingo at home. The numbers are as large as your monitor display, and randomly selected numbers are never repeated during any game. Requires 32K; for the CoCo 1, 2 and 3. *Williams Enterprises, 53 Old Derry Road, Box 7, Hudson, NH 03051, 603-883-2859; tape, $9.95; disk, $11.95. Plus $2 S/H.*

Math Games, a children's educational math package that consists of four BASIC programs: *Raceway*, *Pyramid*, *Go to the Top* and *Math Word Problems*. *Raceway* pits the player against the computer in a race of mathematical problem solving. *Pyramid* is a three-level speed drill. *Go to the Top* helps students with multiplication. *Math Word Problems* presents problems that require addition, subtraction, multiplication and division. For the CoCo 1, 2 and 3. Uses the high-speed poke. *E.Z. Friendly, Hutton & Orchard Streets, Rhinecliff, NY 12574, 914-876-3935; $19.95 plus $1.50 S/H.*

A Mazing World of Malcolm Mortar, a bricklayer's nightmare as you, an apprentice bricklayer, become lost in the mazes of a mansion gone mad. Your foreman has been transformed into the evil Malcolm Mortar, Master of the Mansion Maze and all its creepy creatures. Can you brick up the monsters and find your way through? For the CoCo 3. *Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; $29.95: Available in Radio Shack stores nationwide.*

◆ **Moon Runner**, an arcade game in which the Trigan forces have overtaken the moon system surrounding your planet. Assigned to the Moon Runner, an amphibian surface patroller armed with lasers and missiles, you attempt to destroy the Trigan base. Requires a joystick, 32K and one disk drive. For the CoCo 1, 2 and 3. *Nick Bradbury, 10500 Sandpiper Lane, Knoxville, TN 37922, 615-966-0172; $15.*

Multi-Menu, a *Multi-Vue* compatible menu utility that allows you to define your own menus for use in the *Multi-Vue* environment, designed so that anyone can use it, not just programmers. For the 512K CoCo 3, OS-9 Level II, at least one disk drive and *Multi-Vue*. *Alpha Software Technologies, 2810 Buffon St., Chalmette, LA 70043, 504-279-1653; $19.95.*

Quest for the Ring, a sequel to *Labyrinth* in which your character, even though he has destroyed the evil wizard Zarth, must suffer the consequences of spells Zarth cast before he died. To undo the effects of the spells, you must find the ring he used to make them. Requires 64K Disk ECB; for the CoCo 1 or 2. *RTB Software, P.O. Box 777, W. Acton, MA 01720, 508-263-0563; $34.95 plus $3 S/H.*

TX Mail, a mailing list program that allows entry and editing of addresses. All entries are automatically in edit mode; the cursor is always nondestructive. For the CoCo 1, 2 and 3. *Kolesar B/S, 7 Ladd Ave., Westfield, PA 16950, 814-367-5384; $26.95 plus $2 S/H.*

Teddy Bears, an educational quiz program that employs teddy bears in the learning process. If a child gives a correct response, the bears dance. Teachers or parents can use the program to create various types of quizzes: short answer, fill-in-the-blank, true/false, etc. Joystick and mice supported. Requires 64K ECB and uses the high-speed poke. *E.Z. Friendly, Hutton & Orchard Streets, Rhinecliff, NY 12574, 914-876-3935; $19.95 plus $1.50 S/H.*

Vocal Freedom, a program that turns your CoCo into a digital voice recorder, letting you record your voice or any other sound directly into the computer's memory. Features include sound-activated playback, disk save and load and voice-activated recording. Requires 64K CoCo, Radio Shack Audio Amplifier with built-in speaker (Cat. No. 277-1008), and a microphone. *Dr. Preble's Programs, 6450 Outer Loop, Louisville, KY 40228, 502-969-1818; $34.95.*

The Zapper, a utility that allows you to patch files, as well as entire disks, directly. It displays your file or disk in a format similar to the `dump` command that comes with OS-9. Requires a 64K CoCo, one disk drive and OS-9 Level I or II. *Alpha Software Technologies, 2810 Buffon St., Chalmette, LA 70043, 504-279-1653; $19.95.*

Zoomdump, a PMODE 4 and PMODE 3 graphics screen dump that allows custom printout sizing to within a fraction of an inch. It works with Extended BASIC and a DMP-105 or compatible printer. *Codis Enterprises, 2301-C Central Drive, Suite 684, Bedford, TX 76021, 817-283-8571; $14.*

◆ **First product received from this company**

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Lauren Willoughby

The second in a series of tutorials for the beginner to intermediate machine language programmer

Machine Language Made BASIC

Part II: High Finances

By William P. Nee

First, let's review the SORT program from last month's article. (See Listing 1.) In the random number portion, we used `LDY #$400` to indicate the upper left corner, but in the sort portion we used `LDX #$400` for the same location. This was necessary because the random routine at `$BF1F` uses Register X for its own computations. We could have used Register X if we had saved it prior to executing `$BF1F` and recalled it afterwards; it was easier to use Register Y instead, since it was unchanged. It is a good idea to check any ROM routines for the registers they use prior to putting them in your program. If you have a choice between using Register X or Register Y, use Register X as it takes less memory and executes faster.

In the random portion of our program we checked to see if we had reached the end of the text screen, but in the sort portion we had to check to see if we were one space before the end. This was necessary because loading Register D with the contents of X actually loads Register A with the contents of X and loads Register B with the contents of `X+1`. If we allowed X to go to the end of the text screen, `X+1` would move into the beginnings of graphics — and really start to make a mess!

Line 260 uses a branch (`BLS`) to see if one number is less than or the same as another number. Some branches compare signed numbers and some compare unsigned numbers. Figure 1 shows a comparison of branches for signed and unsigned numbers and what these branches check for.

So far, we've been using whole numbers generally between -32,000 and +32,000, but what about larger numbers or decimals? There is a way to input and save any number within the computer's range; however, it is only accurate to nine digits.

The routine at `$A390` is the equivalent of `LINE INPUT` in BASIC. Whatever you input is stored in memory at `$2DD` in ASCII format. After executing `$A390`, `$2DC` will contain a zero, `$2DD+` will be the ASCII numbers, and the end will be a zero. Register B will be the length of the input plus one, and Register X will be `#$2DC`. Any number you input can be preceded by +, -, &H (Hex), or O (Base 8).

The routine at `$9F` reads whatever is in a buffer whose location is stored in `$A6/A7` and continues to read the buffer one byte at a time into Register A until a zero is reached.

Finally, the routine at `$BD12` will change the ASCII numbers in Register A to floating point format in FP1. Putting all of these routines together gives us a `SAVE` subroutine. (See Listing 2.) Check your result by using the print subroutine from last month's article, Example 13A. (See Listing 3.)

Once a number is in FP1, it usually then has to be stored in some location. The easiest way to do this is to use the routine at `$BC35` to transfer a number in FP1 to the location in Register X using either its name or location. It will take five bytes to completely store the number in floating point format, so reserve five bytes for each number you will be saving in your program.

Let's try the simple program shown in Listing 4 that will take any number, store it and then print it. Our print routine is good only for printing numbers, but BASIC has a `PRINT USING` command that gives you much more flexibility and lets you use the $, commas, +, -, etc. The routine at `$BFA1` is the `PRINT USING` command for machine language; however, some setup is required.

First, determine the number of characters that will be to the right of the decimal, add one, and load this into Register A. Then determine the number of characters you will need to the left of the decimal (including the $ sign, commas, number signs, etc.) and load this into Register B. Register D is then stored in Location `$D8/D9`. The two numbers in `$D8/D9` cannot total more than 17. If they do, you will get either

---

Bill Nee bucked the "snowbird" trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo.

a wrong answer or a Function Call error message.

Location `$DA` must contain a number indicating which format to use. The more common numbers are:

`$DA`	`FORMAT`
`#$2`	`(-)number`
`#$4`	`number(-)`
`#$8`	`(+/-)number`
`#$C`	`number(+/-)`
`#$10`	`floating $`
`#$40`	`floating ,`
`#$50`	`floating $/,`

Adding the numbers together will combine the results. Adding one to the number will print the result in exponential format.

If you need a `PRINT @`, load Register D with the @ location (`+#$400`) and store it in Location `$88` (cursor location). Then you can load Register X with a message location minus one, and `JSR $B99C` will print the message. Try the program shown in Listing 5.

Note that there is a space before the actual message. This space does not appear when the message is printed at Location `$420`. Without the space we would have had to change the message location line to `LDX #MSG-1`. The message must end with a zero (`FCB 0`) to indicate the end of the message. Instead of `FCB 0` we could have used `FDB $0D00` and eliminated the `JSR $B958`, since either will print the carriage return (`#$0D`).

The comparison programs (listings 6 and 7) for this article are simple financial calculators. Each program asks for the annual interest rate, the number of months of the loan (term) and the amount borrowed (financed). The programs compute the monthly payment and print the answer in the `PRINT USING "$#,###.##"` format. You then have the option of inputting any new amount, term, or interest rate. If you run the machine language program from BASIC clear sufficient memory first (`CLEAR 200, &H3000-1`).

As a project, try to modify the program so it will compute the amount, term or monthly payments depending on what you input. Don't try to compute the rate — there is no exact formula for doing so. The basic formulas used in this program are:

rate = annual rate/1200
pv = ((1+r)**term)–1/r((1+r)**term)
monthly payment = amount/pv
(** is used as a symbol for exponential)

(Questions or comments concerning this tutorial may be directed to the author at Route 2, Box 216 C, Mason, WI 54846-9302. Please enclose an SASE when requesting a reply.) ☐

Shifts

BCC	Branch if carry clear (=0)
BCS	Branch if carry set (=1)

Unsigned Numbers

BHI	Branch if higher
BHS	Branch if higher or same
BLO	Branch if lower
BLS	Branch if lower or same
BEQ	Branch if equal (is 0)
BNE	Branch if not equal (is not 0)

Signed Numbers

BGE	Branch if greater than or equal (to 0)
BGT	Branch if greater (than 0)
BLE	Branch if less than or eual (to 0)
BLT	Branch if less (than 0)
BMI	Branch if minus
BPL	Branch if plus
BEQ	Branch if equal (is 0)
BNE	Branch if not equal (is not 0)

Figure 1: Assembly Language Branches

Listing 1:

```
         ORG  $3000
START    JSR  $A928    clear the text screen
         LDY  #$400    top left of text screen
LOOP1    LDD  #255     load register D with 255
         JSR  $B4F4    convert to a FP1 number
         JSR  $BF1F    get RND(255)
         JSR  $B3ED    put it in register D
         STB  ,Y+      put the CHR$ in register Y, move to next space
         CMPY #$5FF    check to see if at bottom right of text screen
         BLS  LOOP1    if not, branch back to LOOP1
SORT     LDA  #1       create a
         STA  FLAG     test "flag"
         LDX  #$400    top left of text screen
LOOP2    LDD  ,X+      load register D with $400/401, move to $401
         PSHS B        save the contents of $401
```

```
          CMPA ,S+      compare what's in $400 to what's in $401
          BLS  CONT     branch if it's less or equal to what's in $400
          EXG  A,B      if not, exchange the contents of $400 and $401
          STD  -1,X     put them back in $400 and $401
          CLR  FLAG     set the "flag" to zero
CONT      CMPX #$5FE    one away from bottom right of text screen?
          BLS  LOOP2    if not, branch back to LOOP2
          TST  FLAG     check the "flag"
          BEQ  SORT     if it's zero, sort again
          JSR  $ADFB    if not, wait for any input
          SWI           end the program (use RTS if in Basic)
FLAG      RMB  1        reserve one byte and call it "flag"
          END  START
```

Listing 2:

```
SAVE      JSR  $A390    input any number
          STX  $A6      put #$2DC in $A6/A7 (buffer location)
          JSR  $9F      increase the buffer location, store ASCII in "A"
          JSR  $BD12    make it a floating point number until reaches 0
          RTS           end the subroutine
```

Listing 3:

```
PRINT     JSR  $BDD9    transfer FP1 to buffer at $3DA
          LEAX -1,X     decrease location for sign
          JSR  $B99C    print buffer contents
          JSR  $B958    print a carriage return
```

Listing 4:

```
          ORG  $3000
SAVE      JSR  $A390    what's the number?
          STX  $A6      buffer starts at $2DC
          JSR  $9F      increase buffer, load "A" with first number
          JSR  $BD12    convert to floating point in FP1
          LDX  #NUMBER  where to store it
          JSR  $BC35    move the number in FP1 to (X)
PRINT     LDX  #NUMBER  where it is
          JSR  $BC14    move the number in (X) to FP1
          JSR  $BDD9    FP1 to ASCII format at $3DA
          LEAX -1,X     decrease buffer location
          JSR  $B99C    print buffer contents
          JSR  $B958    print a carriage return
          SWI           end of program
NUMBER    RMB  5
          END  SAVE
```

Listing 5:

```
          ORG  $3000
PRINT     LDD  #$420    print @ location $420 (second line down)
          STD  $88      store in cursor location
          LDX  #MSG     message location
          JSR  $B99C    print message
          JSR  $B958    print carriage return
          SWI
MSG       FCC  * THIS IS A SAMPLE MESSAGE*
          FCB  0
          END  PRINT
```

Listing 6: FINANBAS

```
10 CLS
20 INPUT"ANNUAL RATE";R:GOSUB 180
30 INPUT"MONTHLY TERM";T:GOSUB 200
40 INPUT"AMOUNT FINANCED";AMOUNT
50 PMT=AMOUNT/PV
60 PRINT"MONTHLY PAYMENT IS - ";
70 PRINT USING"$#,###.##";PMT
80 PRINT"ANY NEW AMOUNT (Y/N)"
90 A$=INKEY$:IF A$="" THEN 90
100 IF A$="Y" THEN 40
110 PRINT"ANY NEW TERM (Y/N)"
120 A$=INKEY$:IF A$="" THEN 120
130 IF A$="Y" THEN 30
140 PRINT"ANY NEW RATE (Y/N)"
150 A$=INKEY$:IF A$="" THEN 150
160 IF A$="Y" THEN 20
170 END
180 R=R/1200
190 RETURN
200 PV=((1+R)^T-1)/(R*(1+R)^T)
210 RETURN
```

Listing 7: FINANBIN

```
3000                    00100          ORG    $3000
3000 BD    A928         00110 START    JSR    $A928     CLEAR SCREEN
3003 8E    3110         00120 INTR     LDX    #MSG1     FIND THE FIRST MESSAGE
3006 BD    B99C         00130          JSR    $B99C     PRINT IT
3009 17    00D8         00140          LBSR   SAVE
300C 8E    30F7         00150          LDX    #RATE
300F BD    BC35         00160          JSR    $BC35     SAVE THE RATE
3012 8D    66           00170          BSR    CONV1
3014 8E    3120         00180 MONTHS   LDX    #MSG2     FIND MESSAGE 2
3017 BD    B99C         00190          JSR    $B99C     PRINT IT
301A 17    00C7         00200          LBSR   SAVE
301D 8E    30FC         00210          LDX    #TERM
3020 BD    BC35         00220          JSR    $BC35     SAVE THE TERM
3023 8D    68           00230          BSR    CONV2
3025 8E    3131         00240 AMOUNT   LDX    #MSG3     FIND MESSAGE 3
3028 BD    B99C         00250          JSR    $B99C     PRINT IT
302B 17    00B6         00260          LBSR   SAVE
302E 8E    310B         00270          LDX    #AMNT
3031 BD    BC35         00280          JSR    $BC35     SAVE THE AMOUNT
3034 8E    3145         00290          LDX    #MSG4     FIND MESSAGE 4
3037 BD    B99C         00300          JSR    $B99C     PRINT IT
303A 8E    3106         00310          LDX    #VARPV
303D BD    BC14         00320          JSR    $BC14     VARPV TO FP1
3040 8E    310B         00330          LDX    #AMNT
3043 BD    BB8F         00340          JSR    $BB8F     AMOUNT*FP1
3046 17    008B         00350          LBSR   PUSING
3049 8E    315C         00360 MORE     LDX    #MSG5     FIND MESSAGE 5
304C BD    B99C         00370          JSR    $B99C     PRINT IT
304F AD    9F A000      00380 LOOP5    JSR    [$A000]   WAIT FOR INPUT
3053 27    FA           00390          BEQ    LOOP5
3055 81    59           00400          CMPA   #'Y
3057 27    CC           00410          BEQ    AMOUNT
3059 8E    3173         00420          LDX    #MSG6     FIND MESSAGE 6
305C BD    B99C         00430          JSR    $B99C     PRINT IT
305F AD    9F A000      00440 LOOP6    JSR    [$A000]   WAIT FOR INPUT
3063 27    FA           00450          BEQ    LOOP6
3065 81    59           00460          CMPA   #'Y
3067 27    AB           00470          BEQ    MONTHS
3069 8E    3188         00480          LDX    #MSG7     FIND MESSAGE 7
306C BD    B99C         00490          JSR    $B99C     PRINT IT
306F AD    9F A000      00500 LOOP7    JSR    [$A000]   WAIT FOR INPUT
3073 27    FA           00510          BEQ    LOOP7
3075 81    59           00520          CMPA   #'Y
3077 27    87           00530          BEQ    START
3079 3F                 00540          SWI              USE RTS IF RUN FROM BASIC
307A CC    04B0         00550 CONV1    LDD    #1200
307D BD    B4F4         00560          JSR    $B4F4     REGISTER D TO FP1
3080 8E    30F7         00570          LDX    #RATE
3083 BD    BB8F         00580          JSR    $BB8F     RATE*FP1
```

```
3086 8E    30F7    00590          LDX     #RATE
3089 BD    BC35    00600          JSR     $BC35    FP1 TO RATE
308C 39            00610          RTS
308D 8E    30F7    00620 CONV2    LDX     #RATE
3090 BD    BC14    00630          JSR     $BC14    RATE TO FP1
3093 C6    01      00640          LDB     #1
3095 BD    BD99    00650          JSR     $BD99    REGISTER B+FP1
3098 BD    8446    00660 LOG      JSR     $8446    COMPUTE THE LOG
309B 8E    30FC    00670          LDX     #TERM
309E BD    BACA    00680          JSR     $BACA    TERM*FP1
30A1 BD    84F2    00690 EXP      JSR     $84F2    COMPUTE THE EXPONENT
30A4 8E    3101    00700          LDX     #VARA
30A7 BD    BC35    00710          JSR     $BC35    FP1 TO VARA
30AA C6    FF      00720          LDB     #-1
30AC BD    BD99    00730          JSR     $BD99    FP1-1
30AF BD    BC5F    00740          JSR     $BC5F    FP1 TO FP2
30B2 8E    30F7    00750          LDX     #RATE
30B5 BD    BB88    00760          JSR     $BB88    FP2/RATE
30B8 BD    BC5F    00770          JSR     $BC5F    FP1 TO FP2
30BB 8E    3101    00780          LDX     #VARA
30BE BD    BB88    00790          JSR     $BB88    FP2/VARA
30C1 8E    3106    00800          LDX     #VARPV
30C4 BD    BC35    00810          JSR     $BC35    FP1 TO VARPV
30C7 39            00820          RTS
30C8 BD    BDD9    00830 PRINT    JSR     $BDD9    CHR$ TO BUFFER
30CB 30    1F      00840          LEAX    -1,X     BUFFER LOCATION -1
30CD BD    B99C    00850          JSR     $B99C    PRINT BUFFER
30D0 BD    B958    00860          JSR     $B958    PRINT A CARRIAGE RETURN
30D3 39            00870          RTS
30D4 CC    0306    00880 PUSING   LDD     #$0306   PRINT USING $#,###.##
30D7 DD    D8      00890          STD     $D8
30D9 86    50      00900          LDA     #$50
30DB 97    DA      00910          STA     $DA
30DD BD    8FA1    00920          JSR     $8FA1    PRINT THE NUMBER
30E0 BD    B958    00930          JSR     $B958    PRINT A CARRIAGE RETURN
30E3 39            00940          RTS
30E4 9E    A6      00950 SAVE     LDX     $A6      GET CURRENT POINTER
30E6 34    10      00960          PSHS    X        SAVE IT
30E8 BD    A390    00970          JSR     $A390    GET INPUT (NO "," OR "$")
30EB 9F    A6      00980          STX     $A6      OUR NEW POINTER
30ED 9D    9F      00990          JSR     $9F      GET NEXT CHR$
30EF BD    BD12    01000          JSR     $BD12    CONVERT TO FP1
30F2 35    10      01010          PULS    X        GET OLD POINTER
30F4 9F    A6      01020          STX     $A6      BACK IN LOCATION
30F6 39            01030          RTS
30F7               01040 RATE     RMB     5
30FC               01050 TERM     RMB     5
3101               01060 VARA     RMB     5
3106               01070 VARPV    RMB     5
310B               01080 AMNT     RMB     5
3110               01090 MSG1     FCC     * ANNUAL RATE - *
311F       00      01100          FCB     0
3120       20      01110 MSG2     FCC     * MONTHLY TERM - *
3130       00      01120          FCB     0
3131       20      01130 MSG3     FCC     * AMOUNT FINANCED - *
3144       00      01140          FCB     0
3145       20      01150 MSG4     FCC     * MONTHLY PAYMENT IS - *
315B       00      01160          FCB     0
315C       20      01170 MSG5     FCC     * ANY NEW AMOUNT (Y/N)*
3171       0D00    01180          FDB     $0D00
3173       20      01190 MSG6     FCC     * ANY NEW TERM (Y/N)*
3186       0D00    01200          FDB     $0D00
3188       20      01210 MSG7     FCC     * ANY NEW RATE (Y/N)*
319B       0D00    01220          FDB     $0D00
           3000    01230          END     START
```

Using control codes to enhance your printer's capability

Printer Diversions and Conversions

By Cray Augsburg
Rainbow Technical Editor

Many computer users report a great deal of confusion about just what their printers are capable of doing and how to make them do those things. And in most cases the manuals offer little or no help to even the intermediate users. "How do I make it do italics?" is a typical question. A more common query here at THE RAINBOW is, "How can I make this program work with my Brand X printer, even though it was written for the Brand Y printer?"

To make a printer perform various tasks — to alter its printing modes and features — we must send it certain *control codes.* These codes are usually simple series of numbers and other characters that the printer understands and interprets via its built-in ROM. For example, to tell the Radio Shack DMP-130 printer to print in italics, we would send the following line from BASIC:

```
PRINT#-2,CHR$(27)CHR$(66)
CHR$(1)
```

Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is CRAY.

Table 1: The ASCII Table

0	NUL	32	Space	64	@	96	'
1	SOH	33	!	65	A	97	a
2	STX	34	"	66	B	98	b
3	EXT	35	#	67	C	99	c
4	EOT	36	$	68	D	100	d
5	ENQ	37	%	69	E	101	e
6	ACK	38	&	70	F	102	f
7	BEL	39	'	71	G	103	g
8	BS	40	(	72	H	104	h
9	HT	41	)	73	I	105	i
10	LF	42	*	74	J	106	j
11	VT	43	+	75	K	107	k
12	FF	44	,	76	L	108	l
13	CR	45	-	77	M	109	m
14	SO	46	.	78	N	110	n
15	SI	47	/	79	O	111	o
16	DLE	48	0	80	P	112	p
17	DC1	49	1	81	Q	113	q
18	DC2	50	2	82	R	114	r
19	DC3	51	3	83	S	115	s
20	DC4	52	4	84	T	116	t
21	NAK	53	5	85	U	117	u
22	SYN	54	6	86	V	118	v
23	ETB	55	7	87	W	119	w
24	CAN	56	8	88	X	120	x
25	EM	57	9	89	Y	121	y
26	SUB	58	:	90	Z	122	z
27	ESC	59	;	91	[	123	{
28	FS	60	<	92	\	124	|
29	GS	61	=	93	]	125	}
30	RS	62	>	94	^	126	~
31	US	63	?	95	_	127	rubout

Table 2: Hexadecimal/Decimal Conversions

00	0	20	32	40	64	60	96	80	128	A0	160	C0	192	E0	224
01	1	21	33	41	65	61	97	81	129	A1	161	C1	193	E1	225
02	2	22	34	42	66	62	98	82	130	A2	162	C2	194	E2	226
03	3	23	35	43	67	63	99	83	131	A3	163	C3	195	E3	227
04	4	24	36	44	68	64	100	84	132	A4	164	C4	196	E4	228
05	5	25	37	45	69	65	101	85	133	A5	165	C5	197	E5	229
06	6	26	38	46	70	66	102	86	134	A6	166	C6	198	E6	230
07	7	27	39	47	71	67	103	87	135	A7	167	C7	199	E7	231
08	8	28	40	48	72	68	104	88	136	A8	168	C8	200	E8	232
09	9	29	41	49	73	69	105	89	137	A9	169	C9	201	E9	233
0A	10	2A	42	4A	74	6A	106	8A	138	AA	170	CA	202	EA	234
0B	11	2B	43	4B	75	6B	107	8B	139	AB	171	CB	203	EB	235
0C	12	2C	44	4C	76	6C	108	8C	140	AC	172	CC	204	EC	236
0D	13	2D	45	4D	77	6D	109	8D	141	AD	173	CD	205	ED	237
0E	14	2E	46	4E	78	6E	110	8E	142	AE	174	CE	206	EE	238
0F	15	2F	47	4F	79	6F	111	8F	143	AF	175	CF	207	EF	239
10	16	30	48	50	80	70	112	90	144	B0	176	D0	208	F0	240
11	17	31	49	51	81	71	113	91	145	B1	177	D1	209	F1	241
12	18	32	50	52	82	72	114	92	146	B2	178	D2	210	F2	242
13	19	33	51	53	83	73	115	93	147	B3	179	D3	211	F3	243
14	20	34	52	54	84	74	116	94	148	B4	180	D4	212	F4	244
15	21	35	53	55	85	75	117	95	149	B5	181	D5	213	F5	245
16	22	36	54	56	86	76	118	96	150	B6	182	D6	214	F6	246
17	23	37	55	57	87	77	119	97	151	B7	183	D7	215	F7	247
18	24	38	56	58	88	78	120	98	152	B8	184	D8	216	F8	248
19	25	39	57	59	89	79	121	99	153	B9	185	D9	217	F9	249
1A	26	3A	58	5A	90	7A	122	9A	154	BA	186	DA	218	FA	250
1B	27	3B	59	5B	91	7B	123	9B	155	BB	187	DB	219	FB	251
1C	28	3C	60	5C	92	7C	124	9C	156	BC	188	DC	220	FC	252
1D	29	3D	61	5D	93	7D	125	9D	157	BD	189	DD	221	FD	253
1E	30	3E	62	5E	94	7E	126	9E	158	BE	190	DE	222	FE	254
1F	31	3F	63	5F	95	7F	127	9F	159	BF	191	DF	223	FF	255

Check Account Information System

Not just another checkbook program but a user friendly, menu driven, disk based information system. Keep track of deposits, checks, ATM withdrawals and other account transactions. Define up to 36 categories to monitor expenses. Set up automatic transactions for such items as direct deposits and deductions. Balance your account(s) in minutes! Other features include multi-drive capability, display and print options, check search on any field, edit and delete capability and more.

Reviewed in Rainbow
February 1988 pg. 133
CoCo 3 compatible
Printer optional

RAINBOW CERTIFICATION SEAL

After Five Software
P.O. Box 210975
Columbia, SC 29221-0975
(803) 788-5995

Send check or M.O. for
$34.95 plus $3.00 S/H.
COD orders: add $2.00.
(SC res. add 5% sales tax)

Summer special! Order before September 1, 1988 for only $29.95.

The first code sent to the printer in this case is `CHR$(27)`. This stands for escape (ESC) and tells the printer a control code is to follow. (Note: Some control codes do *not* require the escape code to be sent first.) The `CHR$(66)` code addresses the printer's italics function, and the `CHR$(1)` tells the printer to turn this feature on. If we substitute a zero for the one in this last code, we tell the printer to turn its italics mode off.

> ***"Control codes are usually a simple series of numbers and other characters that the printer understands and interprets via its built-in ROM."***

One confusing aspect of printer codes is that they can be sent to the printer in many different forms. For example, we could have sent ASCII character designations in the above example. The following line does this:

```
PRINT#-2,CHR$(27);″B;″CHR$
(1)
```

Some printers go a step further and allow the user to enter

```
PRINT#-2,CHR$(27);″B1″
```

to accomplish the same task. The ASCII table shown in Table 1 shows that the number 66 can be represented by the uppercase letter B. On the other hand, the ASCII character 1 translates to a numeric value of 49. A little experimentation is usually necessary before you begin to understand these differences and how your printer interprets them.

The control codes used to access the various features of your printer are found in the manual accompanying the printer. They are usually presented in tabular form near the back. In addition, I have provided in tables 3 and 4 summarized lists of some of the more commonly used codes. Their presentation allows you to cross-reference codes for

Table 3: Epson codes

Y - code is supported
N - code not supported
D - different code used

Function	Codes	Star NX-10	Star NX-1000	Epson MX-80	Epson FX-80	Epson RX-80	Okidata 190+, 290+[1]	Panasonic 1080i and 1091i	Citizen 120D	Seikosha SP-1000A
Underline On	27 45 1	Y	Y	Y	Y	Y	Y	Y	Y	Y
Underline Off	27 45 0	Y	Y	Y	Y	Y	Y	Y	Y	Y
Italics On	27 52	Y	Y	Y	Y	Y	D[3]	Y	Y	Y
Italics Off	27 53	Y	Y	Y	Y	Y	D[3]	Y	Y	Y
Draft/Normal	27 120 0	Y	Y	N	N	N	D[4]	Y	Y	Y
Correspondence/NLQ	27 120 1	Y	Y	N	N	N	D[5]	Y	Y	Y
Pica Pitch	27 80	Y	Y	N	Y	Y	D[6]	Y	Y	Y
Elite Pitch	27 77	Y	Y	N	Y	Y	D[7]	Y	Y	Y
Condensed	15 (on) 18 (off)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Elongated On	27 87 1	Y	Y	Y	Y	Y	Y	Y	Y	Y
Elongated Off	27 87 0	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bold On[2]	27 69 (27 71)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bold Off[2]	27 70 (27 72)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Unidirectional On	27 85 1	Y	Y	Y	Y	Y	Y	Y	Y	Y
Unidirectional Off	27 85 0	Y	Y	Y	Y	Y	Y	Y	Y	Y
Right Margin Set	27 81 n	Y	Y	Y	Y	Y	D[8]	Y	Y	Y
Left Margin Set	27 108 n	Y	Y	N	Y	Y	D[8]	Y	Y	Y
Page Length (Lines)	27 67 n	Y	Y	Y	Y	Y	Y	Y	Y	Y
Paper-Out On	27 57	Y	Y	Y	Y	Y	Y	Y	Y	Y
Paper-Out Off	27 56	Y	Y	Y	Y	Y	Y	Y	Y	Y
6 Lines Per Inch	27 50	Y	Y	Y	Y	Y	Y	Y	Y	Y
8 Lines Per Inch	27 48	Y	Y	Y	Y	Y	Y	Y	Y	Y
Superscript On	27 83 0	Y	Y	Y	Y	Y	Y	Y	Y	Y
Subscript On	27 83 1	Y	Y	Y	Y	Y	Y	Y	Y	Y
Super/Subscript Off	27 84	Y	Y	Y	Y	Y	Y	Y	Y	Y

1) Okidata 190+ and 290+ series using IBM Personality Modules.
2) Some printer manuals indicate the user should use emphasized while others suggest enhanced.
3) Italics on = 27 37 71, Italics off = 27 37 72
4) Draft speed = 27 35 49
5) NLQ mode = 27 73 51
6) Pica pitch = 18
7) Elite pitch = 27 58
8) Left and right margins are set simultaneously: 27 88 l r

OWL-WARE

Proven Technology

New CoCo 3 Utilities

Great for 512K Systems! From Color Venture and OWL-WARE

PRINTER LIGHTNING

A great print spooler which gives you 44K print buffer from a 128K CoCo and up to 438K (200 pages!) from a 512K CoCo. With this spooler you can run a program while you are printing a file. The spooler does not slow down the computer to any noticeable extent while you are running a second program and no lost characters arise. Baud rates selectable. ***Printer Lightning*** can reside in memory along with ***RAMDISK***!

RAMDISK

Using 512K CoCo 3 you have access to 2 additional disk drives in RAM. All disk commands are supported, and the data are Reset button protected. You can now have up to 5 disk drive capacities on line at once and can assign the ram disks to any drive number. By making the ramdisk Drive 0, all programs which require a lot of drive access will run much faster. You can have the ***RAMDISK*** in memory at the same time as the ***Printer Lightning***!

BACKUP LIGHTNING

This program is the fastest way to make backup copies of your files using a 512K CoCo. You can backup 35, 40, or 80 track disks single or double sided. Both RS and OS-9 disks may be backed up. The original disk is saved to memory and a copy can be made on an ***unformatted disk*** every 45 seconds! The lightning read, write, format, and verify routines that were developed make this program much quicker that RSDOS or OS-9 for backups. This will become one of your most used programs!

·NEW·NEW·

Only $19.95 each. 3 for $39.95.

SPECIAL With our 512K Upgrade (Next page) only $2. each or 3 for $5!

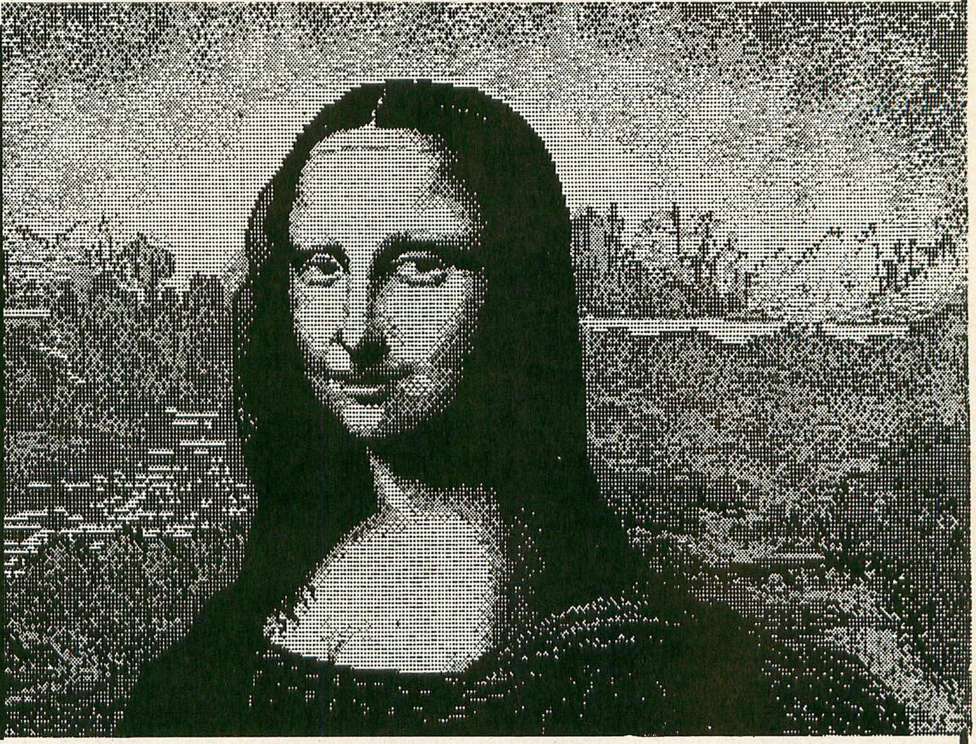
Announcing:

The finest graphics/drawing program for the COCO 3!

Da Vinci 3

- 16 colors on screen at one time
- Modify each color from 64 available colors
- Use composite or RGB monitor
- Draw with custom paintbrushes
- Full resolution 320 X 192
- Picture converter for conversion of COCO 2 pictures to COCO 3
- Multiple text fonts
- Accepts input from joystick, X-pad, mouse, or touch-pad
- Boxes, circles, line, paint generation
- Screen dump for Tandy mono and color ink-jet printers, (NX-10 and others pending)
- Sensible price
- No additional hardware required because of course/fine joystick movement modes
- Zoom mode for individual pixel editing
- Great on screen menu which is removable at the touch of a key to allow full screen edit

128K or 512K COCO 3 $37.95



Super I/O Board for OS-9

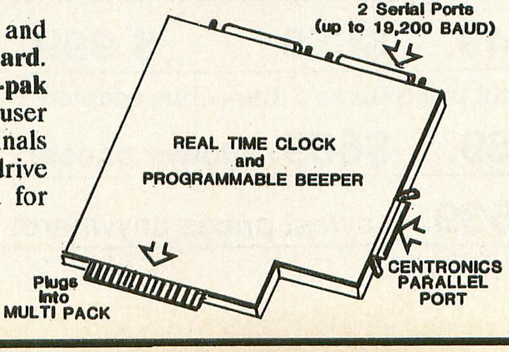
Each Board Provides 2 Serial Ports and Centronics Parallel Port

First Board has Real Time Clock and Beeper... With Second Board up to 5 Users

The serial ports are usable **up to 19,200 Baud**, and the parallel port is a **true Centronics standard**. Plug into your multi-pak. **On CoCo 3, multi-pak must be upgraded.** You will have a multi-user system with additional computers or terminals plugged into the serial ports. An OWL hard drive and 512K upgrade are strongly recommended for multi-user systems.

Intro Price... $169.

BOARD 2... $145.



More Ads... ⇨

OWL-WARE

P.O. Box 116-A
Mertztown, PA 19539
— ORDER LINES (only) —
(800) 245-6228
(215) 682-6855 (PA)

OWL-WARE

Proven

On the Razor's Edge of

Basic and OS-9 Hard Drive Systems

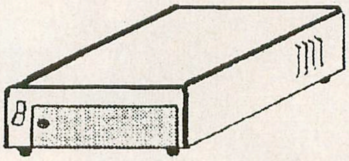
Proven Performance for Demanding Home or Business Users

Every hard drive which has been produced by OWL-WARE during the last 3 years is **complete**. A system consists of software, hard drive, controller, heavy-duty power supply, and LR Tech Interface. There are no hidden costs for assembly or testing. When a drive system is ordered, we fully **assemble**, **test**, and **burn-in** the system for 3 full days. This ensures dependability and optimum performance.

We have now been supplying CoCo hard drive systems and parts for more than 3 years. This is the longest history in the CoCo market of any system. Some other advertisers are stating that they have one of the most reliable systems for the CoCo *with all of 4 months history in the CoCo hard drive market*! We have reached our position in the hard drive market by providing our customers with a quality product that they (and we) can be proud to own and use.

Because of many requests for a lower price system in kit form, we are now selling a kit of all parts at a significant discount compared to our regular prices. We recommend this kit (or any kits offered by any other supplier) only to those who have experience in electronic assembly and OS-9.

For OS-9 Levels 1 and 2



10 Meg.	20 Meg.	40 Meg.	80 Meg. (2 X 40 Meg.)
System Prices: (Includes Hard Drive, Controller, LR Tech Interface, Software. Fully assembled and tested.)			
$469.	$599.	$725.	$1,069.
Kit Prices: (LR Tech System as above but not assembled or tested.)			
$419.	$549.	$659.	$ 999.
Kit Prices: (As above but using Burke & Burke bus adapter)			
(na)	$489.	$609. (lower prices)	

30 Meg Kit: $539. (Lowest prices anywhere)

OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes **assembly**, **testing**, and **3-day burn-in** period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 3 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

The table below will summarize some of the key points about our BASIC hard drive system and two other systems. We believe that we have the best BASIC interface for CoCo hard drives available.

BASIC Hard Drive Systems*

Feature	OWL	B&B	RGB
Drive Portion Available	Entire	Entire(?)	Entire
User Sets BASIC/OS-9 Partitions	YES	Yes	No
Add to Existing OS-9 Drive Without Reformat	YES	Yes(?)	No
Drives 0-3 Hard/Floppy	YES	No	Yes
Built in Park	YES	No	Yes
Speed*	FAST	Fast	Fast

*All feature details are believed to be true at time of writing and are subject to change. We believe that our BASIC hard drives are the fastest due to our indexing method, but all three systems are fast. On ours all BASIC commands work including DSKINI, DSKI$, and DSKO$.

Prices: With/Without Hard Drive

$35./$79.

Technology

the Color Computer Frontier

DISK DRIVES

Bonus!
Special
Bundled
Software
with any
Disk Drive
Purchase!

Floppy Drive Systems

The Highest Quality for Service Now and for Years to Come

Use our WHISPER DRIVE for the finest, quietist drive

Drive 0 Systems (Half Height, Double Sided, Direct Drives) $219.

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) $129.

New 3.5", 720K Drives for OS-9 with case & Power Supply $179.

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (Drives 0,1,2,3) $315.

HALF- HEIGHT DRIVE UPGRADES FOR RS HORIZONTAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model 500 $119. Model 501 or 502 $129.

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

OWL Phones

Order Numbers (only)

1-800-245-6228
1-215-682-6855

Technical Help
1-215-837-1917

OWL WARE Software Bundle

Disk Tutorial/Utilities/Games

DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

OWL DOS

An operating system that gives faster disk access and allows the use of double-sided drives. Corrects a floating point number error on early CoCo systems.

COPY-IT

Quickly copies selected programs between disks. A wild card option selects groups of programs to copy.

VERIFY

Verifies reading of each sector. Bad sectors are listed on the screen.

2 GAMES

We will select 2 games from our stock. These sold for more than $20 each.

If sold separately this is more than $125 worth of software!!

Do not mistake this software with cheap, non-professional "Public Domain" software which is being offered by others. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

only $27.95
(or even better)
only $6.95 with
any Disk Drive Purchase!!

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

OWL-WARE
P.O. BOX 116
Mertztown, PA 19539

your printer to others. Armed with this information, a little common sense and a moderate amount of time, you can modify BASIC programs from THE RAINBOW that were written for other printers, as well.

Not counting LaserJets and certain other printers, we come into contact with three basic types of control codes used by printer manufacturers: Epson Standard codes, IBM codes and Tandy codes. For the most part, the Epson and IBM codes are identical. To see some of the differences, however, compare the Okidata (IBM mode) codes presented in Table 3 with those for the other printers. The largest schism we see is between the Tandy-type codes and the other two. More work is usually required in converting between these types.

> ***"One confusing aspect of printer codes is that they can be sent to the printer in many different forms."***

To convert a BASIC program for your printer, first go through the listing line by line and determine which lines contain control codes and what those codes are. I find the best way to do this is to look for lines that contain `PRINT#-2`. In some cases the program may send character strings (`CHR$`) that are not control codes, but simply print data. For example, instead of using `PRINT#-2,"*"` to print an asterisk, the programmer might have chosen to use `PRINT#-2,CHR$(42)`. Watch for this situation, and experiment to find the differences between control codes and data to be printed.

If you know for which printer the program was written, you can compare the codes you find and quickly replace the codes with those for your own printer. Keep in mind that you may have to refer to the ASCII and Hex tables (tables 1 and 2) in correctly determining the proper codes and their corresponding functions.

If you don't know which printer the author used, your work will be a little harder. You can compare the codes you find with those given in these tables to determine what function is being used. Then cross-reference the code for your printer.

In addition to information about various dot matrix printers, I have included the codes for the Radio Shack DWP-210 and DWP-230 printers (Table 5). As expected, these daisy-wheel printers don't offer as much control to the user. Also, Table 6 shows the various codes used for the Radio Shack CGP-220 Inkjet printer.

Some control codes are standard for nearly every printer made. These codes control basic printhead and platen movement and are listed below.

`CHR$(8)`	backspace
`CHR$(10)`	forward linefeed
`CHR$(12)`	formfeed
`CHR$(13)`	carriage return

Table 4: Radio Shack DMP codes

Y - code is supported
N - code not supported
D - different code used

Function	Codes	Radio Shack DMP-130	Radio Shack DMP-105/106
Underline On	15	Y	Y
Underline Off	14	Y	Y
Italics On	27 66 1	Y	N
Italics Off	27 66 0	Y	N
Draft/Normal	27 19	Y	N
Correspondence/NLQ	27 18	Y	N
Pica (10 CPI)	27 19	Y	Y
Elite (12 CPI)[1]	27 23 (27 29)	Y	Y
Condensed (16.7 CPI)	27 20	Y	Y
Elongated On	27 14	Y	Y
Elongated Off	27 15	Y	Y
Bold On	27 31	Y	Y
Bold Off	27 32	Y	Y
Unidirectional On	27 85 1	Y	Y
Unidirectional Off	27 85 0	Y	Y
Right Margin Set	27 82 n	Y	N
Left Margin Set	27 81 n	Y	N
Page Length (inches)	27 52 n	Y	N
Paper-Out On		N	N
Paper-Out Off		N	N
6 Lines Per Inch	27 54	Y	Y
8 Lines Per Inch	27 56	Y	Y
Superscript On[2]	27 83 0	Y	Y
Subscript On[2]	27 83 1	Y	Y
Super/Subscript Off[2]	27 88	Y	Y

1) Second code shown is for NLQ Elite pitch.
2) Super- and subscripts not supported on the DMP-105

Table 5: Radio Shack DWP printers

Function	Codes	DWP-210	DWP-230
Underline On	15	Y	Y
Underline Off	14	Y	Y
Pica (10 Pitch)	27 15	Y	Y
Elite (12 Pitch)	27 14	Y	Y
Bold On	27 31	Y	Y
Bold Off	27 32	Y	Y

Table 6: Codes for the CGP-220

CHR$(8)	Backspace in text mode.
CHR$(11)	Reverse Line Feed in text mode.
CHR$(17)	Select Text Mode.
CHR$(18)	Select Graphic Mode.
CHR$(29)	Change color in Text Mode.
A	Reset
C*number*	Change color. *number* from 0-3.
D*destination*	Draw from current coordinate to specified position.
H	Move pen to current origin w/o drawing.
I	Sets new origin.
J*destination*	Draw a line from current pen location *x* steps to the right and *y* steps up.
L*type*	Change line type (0-15). 0 is a solid line. 1-15 draw dashed lines.
M*x*,*y*	Move without drawing to location *x* steps right (left) and *y* steps up (down) of present origin. *Absolute*.
P*characters*	Print characters in Graphic Mode.
Q*direction*	Change print direction. *direction* is 0-3. 0=normal, left-to-right; 1=top-to-bottom; 2=upside-down; 3=bottom-to-top.
R*x*,*y*	Move without drawing from present location to location *x* steps to the right (left) and *y* steps up (down). *Relative*.
S*size*	Specifies size of printed characters drawn with P command.
X*axis*,*step*, *intervals*	Draw a coordinate axis from present location in direction specified by *axis* using increments of *step* and marking *intervals* of them.

As a final note, you will undoubtedly encounter some codes for which your printer offers no direct equivalent. For example, your particular printer may not support super- and subscript printing. However, if it supports half-reverse and half-forward linefeeds, you will find these codes can be combined to emulate super- and subscripts. Trial and error is often helpful in altering programs. There may also be times when your printer cannot duplicate a particular function. In these cases it is up to you to determine whether you leave the code out altogether or try a different approach.

Based on the difficulties often encountered in converting codes for various printers, I ask that all programmers who submit material to THE RAINBOW follow certain guidelines. Please include a table with your submission detailing the printer control codes used by your program, the functions they perform and in which lines they appear. Finally, let the reader know exactly which printer your program is designed for. With this information and the printer manual, RAINBOW readers should be able to make quick work of deleting your codes and replacing them with those for their system.

Due to the complexities and differences involved, I have avoided discussion of graphics control codes and the transfer of graphics data. This information can be used as a stepping stone, however, if you are interested in learning more about printers.

Lyra
Lyra is the premier music composition program that lets your CoCo talk to your MIDI synthesizer. You can't find a program that is easier to use! It is as simple as "pick up a note and put it on the staff". Lyra is also very powerful. Individual notes can easily be changed or blocks of music may be copied or deleted. Create full sounding music with 8 parts using a range of note values from whole to 64ths with any combination of dots, triplets, or ties. Change volume, tempo, and instruments anywhere in the music. Set synthesizer configurations or even upload new instrument patches from the score! Now includes LyraPrint, which will print your masterpiece on a dot matrix printer (Epson, Gemini, Radio Shack, and Oki Data 92), and a cable to connect the CoCo to a MIDI synthesizer. Requires a disk drive, a mouse and any version of the Color Computer. $59.95

Lyra Lybrary
Here's a collection of music that will please any taste! Over 11 disks packed with a variety of music that will exercise your MIDI synthesizer. Enjoy music from Bach to the Beatles. Edit the music on Lyra or just play it using the "jukebox" type program included. Requires a disk drive, a mouse, and a Lyra MIDI cable. Send a SASE for a complete listing of available titles. Each disk $14.95

Rulaford Research
P.O. Box 143
Imperial Beach, CA 92032
(619) 690-1181 (evenings 6-10 PT)

We're a new company here to give you the best in music products for the Color Computer. We think you will like what we have to offer. If you have a new music program or ideas or comments, let us know! Inquire about our other products.

Ordering information: Send a check or money order; sorry, no credit cards. COD is OK. Shipping and handling within continental USA included in price. CA residents add 6% tax.

Isolating and repairing keyboard problems

Ar_ Y_u Missi_g S_m_thi_g?

By Roger D. Dowd

I like to experiment with many hardware modifications and do all of my own repairs on my Color Computer. This normally involves removing and re-inserting the keyboard, causing a lot of wear and tear on the delicate keyboard connector.

The keyboards (CoCo 1 'F' Board and later) for Radio Shack's Color Computers are made of a very fragile plastic membrane, with thin conductor runs on one side. The conductor runs are easily damaged if scratched or overflexed. Once damaged, the runs cannot be repaired by soldering, as the heat from the soldering iron melts the plastic. Replacement keyboards can be purchased for between $5 and $50, although the $5 keyboards that were discontinued by Radio Shack a year or two ago are getting more difficult to find.

The procedures described in this article require that some tests be performed with the computer's cover removed and the power on. Hazardous and potentially lethal voltages exist inside the computer around the power supply and on-off power switch. Be extremely careful around this area of the computer. The rest of the computer contains very low voltages, but relatively high current. Remove any jewelry from your wrists and hands to avoid personal injury from shock or burns and possible damage to the computer. Every effort has been made to provide accurate information and safe procedures. Neither the author or the publisher will be held liable for any injuries to person or damage to equipment. Be aware that removal of the computer cover and subsequent modification or repairs will void any existing warranties.

Roger Dowd (WA4QAS) is an electronics technician and an advanced class amateur radio operator. His hobbies include packet radio, computers, and building and experimenting with all types of electronic projects.

Before I explain how to repair the keyboard, it is important to first explain that keyboard problems can appear from different sources. The first, as mentioned above, is due to stress and abuse of the keyboard connector. The other is from a faulty Peripheral Interface Adapter (PIA). If you have never taken your computer apart or it has been some time since you had it apart, and you suddenly develop keyboard trouble, suspect a faulty PIA.

PIA trouble can cause such symptoms as missing characters, erroneous characters appearing from seemingly nowhere, intermittent key bounce or a dead keyboard. The easiest way to check for a defective PIA is to simply replace the suspect PIA with a known good one. You will need to refer to the technical reference manual for your particular model CoCo to find which PIA to replace. Always use an exact replacement.

On the newer model CoCos (CoCo 2B, CoCo 3s), the PIA chips are soldered directly to the board. To remove the PIA chips from the later model CoCos, you will have to carefully desolder the chips with a desoldering tool and desolder wick. (Note: This is a job for someone who is skilled in soldering and desoldering integrated circuits.) Before reinstalling the PIA chip, solder in a socket first, then plug in the PIA chip. Any time you do any modification or repair where you must desolder a chip, solder in a socket first before you reinstall the chip. This will save you a lot of aggravation later, as well as wear and tear on the computer circuit board.

To determine which run or line is open, type in the following jingle exactly as it is written: `The quick brown fox jumped over the lazy dog's back 0123456789`. This jingle will test the entire keyboard matrix. Make note of all the characters that are missing. Looking at Figure 1, you will see 16 lines coming from the keyboard matrix. Find the line that all of the missing characters have in common. For example, on my keyboard the G, O, W, space bar and 7 characters were missing. All of these keys have Line 16 in common. If the letters P, Q, R, S, T, etc., had been missing, then Line 4 would have been defective.

To repair a damaged connector you will need to purchase Loctite's "Quick Grid" Rear Window Defogger Repair Kit, Part No. 15067, available for about $7 at most hardware and auto parts stores. The heart of this kit is a very tiny bottle of highly conductive paint. Be-

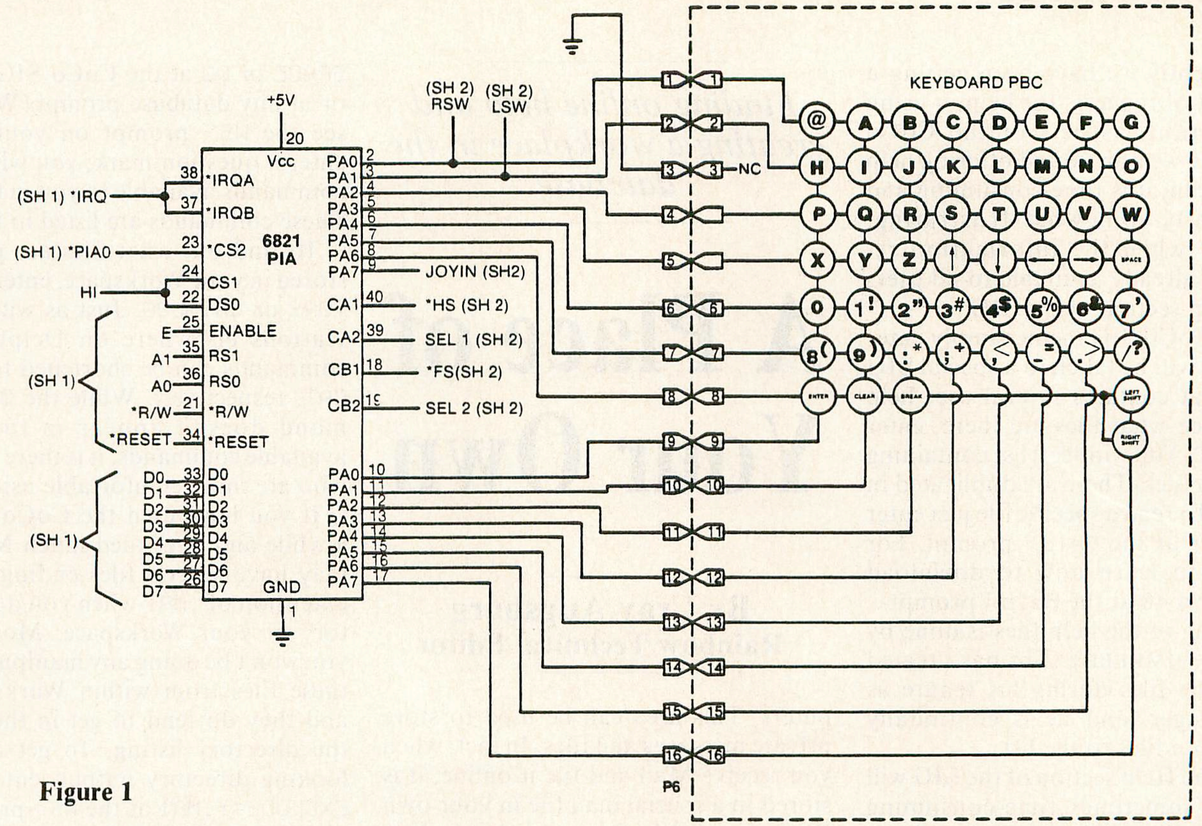

+5V
20
Vcc
6821
PIA
(SH 1) *IRQ
38 *IRQA
37 *IRQB
(SH 1) *PIA0
23 *CS2
24 CS1
HI
22 DS0
E
25 ENABLE
A1
35 RS1
(SH 1)
A0
36 RS0
*R/W
21 *R/W
*RESET
34 *RESET
D0 33 D0
D1 32 D1
D2 31 D2
D3 30 D3
(SH 1)
D4 29 D4
D5 28 D5
D6 27 D6
D7 26 D7
GND
1
PA0 2
PA1 3
PA2 4
PA3 5
PA4 6
PA5 7
PA6 8
PA7 9
JOYIN (SH2)
CA1 40
*HS (SH 2)
CA2 39
SEL 1 (SH 2)
CB1 18
*FS(SH 2)
CB2 19
SEL 2 (SH 2)
PA0 10
PA1 11
PA2 12
PA3 13
PA4 14
PA5 15
PA6 16
PA7 17
(SH 2) RSW
(SH 2) LSW
NC
P6
KEYBOARD PBC
@ A B C D E F G
H I J K L M N O
P Q R S T U V W
X Y Z ↑ ↓ ← → SPACE
0 1! 2" 3# 4$ 5% 6& 7'
8(9) :* ;+ ,< -= .> /?
ENTER CLEAR BREAK LEFT SHIFT
RIGHT SHIFT

Figure 1

fore you use the paint, shake the bottle very vigorously to get the conductive material to mix with the liquid medium. The paint dries extremely fast, so keep the lid on the bottle whenever you are not actually using it. Because the tiny bottle is so expensive I recommend not using the brush normally supplied with the kit, but straightening a paper clip and using that instead. This will prevent too much of the precious paint from being wasted on the brush. Carefully dip one end of the paper clip into the paint until a small amount of paint has collected on the end of the clip. Dot the paint gently onto the break in the run, making sure to overlap both sides of the break. It will take only a minute or two to dry. Once it has dried, repeat the process two or three more times to get a good coat built up and to ensure good conductivity. Try not to get any of the paint on any of the neighboring runs. After the final coat has been applied, wait about five or 10 minutes for the paint to completely dry. Gently scrape any excess paint from each side of the run with an X-acto knife.

Measure the repaired run for conductivity. If you don't have good conductivity, you will have to scrape off the old paint and repeat the entire process. Failure to get good conductivity is most likely due to not shaking the paint well enough. You *must* shake the paint bottle *vigorously*! One of my keyboards had excessive run damage, with one run almost entirely destroyed. I repainted nearly the entire run and restored the keyboard to full use. Although the price of the repair kit may seem expensive, remember that it can have other uses around the home or shop. This is especially true if you etch and build many of your own electronic projects, as I do.

If a break or tear in the run is not obvious, determine if the problem is a spread pin by turning the computer on. With a small, blunt metallic probe, such as a probe of an ohmeter, gently touch the suspect socket pin and keyboard connector run at the point (in the first example, Pin 16) where the two meet. At the same time, type in one of the characters that was missing. *If the key* suddenly begins to work but then just as suddenly quits working when the probe is removed, your problem is most likely a spread pin inside the motherboard socket. This may be fixed by removing the keyboard and gently and carefully squeezing the socket together with a pair of pliers. If that doesn't work, the socket may have to be replaced. A replacement socket may be ordered from Tandy National Parts Center.

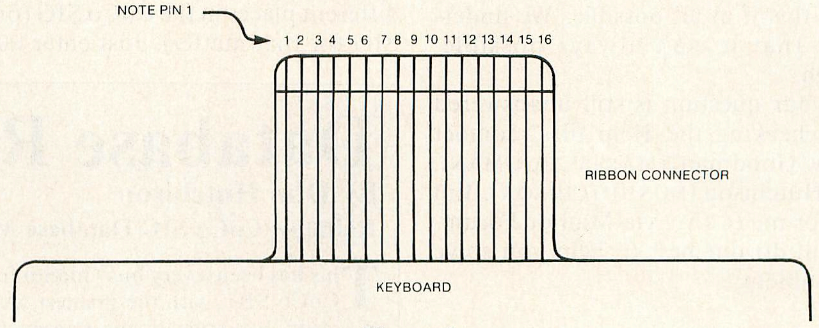

NOTE PIN 1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
RIBBON CONNECTOR
KEYBOARD

Figure 2

(Questions or comments regarding this project may be directed to the author at 205 Williams Drive, Bonaire, GA 31005. Please enclose an SASE when requesting a reply.)

Finding online help and creating a workplace in the database

A Place of Your Own

By Cray Augsburg
Rainbow Technical Editor

Recently we have been getting a lot of requests for help in using various aspects of the CoCo SIG. While we don't mind offering help when we can, it is time-consuming and occasionally somewhat frustrating, especially when the information requested is already available to all users in the Help section of the SIG.

At the CoCo SIG menu, simply enter `HELP`; you will be taken to a special SIG section that contains several user help files. To see what files are there, enter `SCAN` or `SC`. You will see a list containing many help files. These are duplicated in Figure 1. To read a specific file just enter its number at the `Help>` prompt. For example, to learn how to download files, enter a `40` at the `Help>` prompt.

Handling of the help files is done by Jim Reed (JIMREED). Jim has created most of the files during his tenure as SIG Manager, and he is continually adding more files to the list.

Using the Help section of the SIG will eliminate sometimes time-consuming correspondence back and forth with the SIG staff. In many cases, a simple question can turn into 10 or 12 letters in Mail. Obviously, we would like to avoid this if at all possible. We understand that it isn't always possible, though.

If your question is still unanswered after checking the Help files, contact Marty Goodman (MARTYGOODMAN), Don Hutchison (DONHUTCHISON), Jim Reed or me (CRAY) via Mail or Forum. We will do our best to help you solve the problem.

Workplace in Workspace

One of the most useful and powerful areas of Delphi is the Workspace area. At the same time, it is often the most unused area. Many users, especially newer ones, are easily intimidated by Workspace — or they just don't understand all the power it gives them. It doesn't take an interested user long to find out that in order to upload a file, it must be done from within this area.

Every Delphi user has a personal storage area set aside on Delphi's computers. This area can be used to store private messages and files. In fact, when you receive Mail and file it online, it is stored in a special mail file in your own Workspace. Other users cannot get into your Workspace unless they use your username and password.

You can get to Workspace from two different places in the CoCo SIG (or any SIG for that matter). Just enter `WORKSPACE` or `WO` at the CoCo SIG prompt or at any database prompt. When you see the `WS>` prompt on your screen, enter a question mark; you will see the commands available to you in this area. These commands are listed in Figure 2.

To find out what files are presently stored in your Workspace, enter `DIRECTORY` or `CATALOG`. Just as with abbreviations elsewhere on Delphi, these commands can be shortened to `DIR` or `CAT`, respectively. While the `DIR` command doesn't appear in the list of available commands, it is there for those who are more comfortable using it.

If you have used the CoCo SIG for a while and have filed much Mail, you may have several files ending with an extension of `.MAI` when you do a directory of your Workspace. Most likely, you won't be doing any manipulation of these files from within Workspace — and they do tend to get in the way in the directory listing. To get a better-looking directory output, enter `DIR /EXCLUDE=*.MAI` at the `WS>` prompt.

Files in Workspace each have a filename, a three-character extension and a version number. The filename and extension should be self-explanatory to most users. The version number, however, may cause some confusion for

---

Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is CRAY.

Database Report

By Don Hutchison
Rainbow CoCo SIG Database Manager

This has been a very busy month for the CoCo SIG, with the greatest amount of action occurring in the Graphics and Utilities and Applications topics of the database.

OS-9 Online

In the General topic of the database, **Kevin Darling** (KDARLING)posted a text file describing a method for running *Sub Battle* under *Multi-Vue*. The method is also applicable to other programs that require a VDG screen to operate.

In the Applications topic of the database, **Dennis Weldy** (OS9ER) uploaded `SCREEN PAINTER`, a utility for setting up the screen form to your liking with *Sculptor*. **Steve Clark** (STEVECLARK) posted a revised text search and find utility that reads filenames from the standard input rather than from a fixed filename. Steve also uploaded a menu choice application program for Level II that allows the creation of mouse- or joystick-controlled applications.

In the Utilities topic of the database, **Brian Wright** (POLTERGEIST) posted a utility using English-language variables and decimal numbers that is a replacement for the `DISPLAY` command. Kevin Darling, with the kind permission of Ron Lammardo, posted *Shell+*(Version 1.2) for OS-9 Level II. *Shell+* is designed as a replacement for the current shell on Level II CoCo 3s. It features some fixes for the previous version, a programmable prompt, shell scripts in the current execution directory and a few other neat things. **Bruce Terry** (THEMAGE) uploaded both an Icon and a font editor to run under `WindInt`.

In the Device Drivers topic of the database, **Greg Law** (GREGL) gave us five VDG device descriptors, called V0 through V4, which can be used along with `Term_Win` and windows. **Ken Schunk** (KENSCHUNK) posted a driver that cures a problem in the VDG driver supplied with the developer's pack. The driver was written by Volney Larowe of Saratoga Springs, NY. Brian Wright sent us a device driver that partitions a CoCo 3's 512K memory into a fast RAM disk.

In the Patches topic of the database, **Michael Washburn** (COMPZAP) posted `PGPATCH`, a text file describing how to patch `PHANTOMGRAPH` to work with Star Gemini printers (10x, 15x and possibly others), using a `MODPATCH` script (included) or by using a `IPATCH`.

In the Graphics and Music topic of the database, **Mark O'Pella** (MDODELPHI) uploaded an original composition done using *Umuse*.

CoCo SIG

In the General Information topic of the database, I (DONHUTCHISON) uploaded a humorous document concerning some of the not-too-obvious benefits of going to RAINBOWfest, while **Marty Goodman** (MARTYGOODMAN) posted two informative reports about the Chicago RAINBOWfest as it was happening. **Roger Bouchard** (HARBIE) posted a text file describing the various alternatives for phone users in accessing the information services. Roger also uploaded several comic files for the amusement of SIG members, as well as some interesting commentaries concerning a pirate BBS and the effect of plastics on the environment. I also posted some humorous files passed to me by Rick Adams from UseNet concerning hotel soap and more of the light bulb trivia.

In the CoCo 3 Graphics topic of the database, **Orman Beckles** (ORMAN) uploaded his utility called `Super XL256 Mach I`, which is a new version of Roger Bouchard's `XL256`. Orman's version allows the user to load a digitized picture, alter the horizontal and vertical position, change the colors and then save the resulting picture in *CoCoMax 3* format. **Heath Dingwell** (OS9KID) uploaded several nudes in *CM3* format, his favorite *CM3* picture viewer, some *CM3* pictures from popular James Bond films and some detailed pictures of sports cars. **Donald Ricketts** (STEVEPDX) uploaded a palette changer utility for digitized *CM3* images. Roger Bouchard posted an upgrade for his popular `XL256` utility for converting digitized images to *CM3* format, as well as a revised version of his demo program for MGE

serious users unless they learn to understand them. We will hold off discussion of version numbers until we have some files to work with.

Creating a File

To write or build a text file in your Workspace, you will use the `CREATE` command. Enter `CREATE` *filename* at the `WS>` prompt. For this example, use `TEST1.TXT` as the filename. When Delphi is ready for you to write the text file, it will tell you to enter your text. It also explains your options of using CTRL-Z to save the file or CTRL-C to abort the creation process. Now type the following lines, pressing ENTER after each:

```
THIS IS MY FIRST LINE.
THIS IS MY SECOND LINE.
THIS IS THE FINAL LINE.
```

When you have pressed ENTER after the last line, press CTRL-Z and your file will be saved. Now when you enter `DIR`, you should see `TEST1.TXT;1` as one of the entries. Let's go ahead and create a second file. Call this one `TEST2.TXT`. Enter each of the following lines in this new file:

```
SECOND FILE, FIRST LINE.
SECOND FILE, SECOND LINE.
SECOND FILE, FINAL LINE.
```

Figure 1: List of help files available in Help section of CoCo SIG.

1. APPOINTMENT CALENDAR
2. AUTO-HANGUP ON TELENET
3. CHANGING YOUR PASSWORD
4. COCO COMPOSER HELP
5. CONFERENCE HELP
6. CONFERENCE HINT
7. CONFERENCE: /DIR & /DISPLAY
8. CONTROL CODES
9. CONTROL-O RESPONSIVENESS
10. CONTROL-Z IS HANDY.
11. DATABASE HINT, LEADING SPACES
12. DATABASE STANDARDS
13. DATABASE UPDATE 9-15-87
14. DECEMBER DELPHI NEWSLETTER
15. DEFAULTING INTO THE COCO SIG
16. DELPHI COMMAND CARD
17. DELPHI: THE OFFICIAL GUIDE
18. DISABLING CALL WAITING
19. DOT COMMANDS IN FORUM
20. ECHO CAUSES DOUBLE LETTERS
21. EDIT MODE
22. EDITING IN FORUM HINT
23. EDITOR: PICK FROM TWO
24. EDITOR:OLDIE COMMANDS
25. ELIM. MAIL IN WORKSPACE DIR
26. ENT: TO SEE LAST ENTRY
27. FOLDERS ENHANCE MAIL FACILITY
28. FORUM CHANGES, 11/8/86
29. FORUM CHANGES, 12/29/86
30. FORUM COMMAND LIST
31. FORUM EDITING HINT
32. FORUM ENHANCEMENT, 1/5/86
33. FORUM HELP
34. FORUM READING NONSTOP
35. FREE UPLOAD TIME AVAILABLE
36. GETTING INTO MAIL QUICKLY
37. GO COMMAND
38. HANDLES ARE HANDY
39. HELP IS ALWAYS AVAILABLE
40. HOW TO DOWNLOAD FILES
41. LINEFEEDS
42. MENUS CAN BE ELIMINATED
43. MORE? PROMPT CAN BE ALTERED
44. NEW DELPHI BOOK OUT
45. NEW SIGWARE, 12/15/86
46. NEW SIGWARE, 8/1/87
47. NO SUCH USER
48. PAGERS ARE TOO IMPATIENT
49. PROFILE NEEDED FROM YOU!
50. QUICK (TRUE) BREAK
51. QUIT COMMAND IN FORUM
52. RAINBOW DATABASE & CASSETTE US
53. RAINBOW ON TAPE DATABASE
54. RAINBOW ON TAPE DOWNLOADING
55. RAINBOW ON TAPE ORDERS
56. RAINBOW SUBSCRIPTION PROBLEM
57. READING NONSTOP OVER RANGE
58. ROLL THEM BONES
59. SETTING SETTINGS
60. SUBMISSIONS FOR RAINBOW PUBLIC
61. SUBMITTING A FILE
62. SURCHARGED DOWNLOADS
63. SURCHARGED FILES EXPLAINED
64. TELENET LOGON PROCEDURE
65. THE /NAME COMMAND IN CONFERENC
66. TIMEOUT CAN BE VARIED
67. TIP FOR PRINTOUTS
68. TO SKIP A SECTION
69. TO STOP OUTPUT
70. TRY /TIME
71. UNWARRANTED "NO SUCH USER" MES
72. USERNAME CAN BE CHANGED
73. USING THE MEMBER DIRECTORY
74. VOTE IN OUR POLLS
75. WHEN YOU ARE PAGED
76. XMODEM DOWNLOADING
77. XMODEM UPLOADING
78. YOUR OWN NAME NEEDED

pictures. The CoCo Gallery pictures for the months of February through July 1988 are now available, also. (NOTE: The Gallery pictures are now available online at approximately the same time as the RAINBOW ON TAPE and DISK programs from each monthly issue of THE RAINBOW. They are posted in the appropriate topic of the database, either CoCo 3 Graphics or Classic Graphics.) **Mike Stute** (GRIDBUG) sent us a clever BASIC picture of a cat as he tears up his owner's curtains! **Billy Hambric** (SNOOPYDOG) sent us some digitized scenes from the motion picture *Beauty and the Beast* and a digitized shot from *Star Trek*. **Mike Andrews** (MANDREWS) sent us a text file containing the file specifications for the *MacPaint* pictures. **David Brown** (NASAI) sent us a utility called `PICUP` for moving a picture upward on the Hi-Res screen.

In the Utilities and Applications topic of the database, **Dave Stampe**, author of *CoCo Max 3* and other fine programs, has placed *Colour Key* in the database of the CoCo SIG! Dave gave us the programs while attending the Chicago RAINBOWfest. *Colour Key* is a powerful BASIC programmer's utility for the Color Computer 1 and 2 that incorporates many useful programming tools such as full screen editing, repeating keys, user-definable keys, automatic line number generation, full error and break key trapping, reverse video option, compatibility with the CoCo 3 in CoCo 2 mode and dozens of other handy features that no CoCo programmer should be without. A version of *Colour Key* is available for the CoCos 1 and 2 and the CoCo 3. Dave also provided us with *FFT*, a program designed to perform FFTs and IFFTs on a set of 256 data points. An FFT turns a waveform into a frequency/power graph, and an IFFT does the opposite. You could use the FFT to sample sounds, get the response of a filter from its impulse response or synthesize the response of a filter or a waveform from a set of frequencies and phases with the IFFT. **Richard Ortman** (RAO) sent us a filing system for comic book collections that also features a sort routine. **Ken Halter** (KENHALTER) uploaded a set of programs that may be used to sort multiple arrays. **David Mills** (DAVIDMILLS) uploaded an encryption utility for scrambling any or all of the files on a disk using a user-supplied code, as well as a 512K disk backup utility. **John Barrett** (JBARRETT) sent us his *Deed Checker* program for realtors, and **Alan DeKok** (ALANDEKOK) posted his *Fastdrive* utility that enables the CoCo 3 to work at double speed during all disk access. Alan included the *EDTASM+* source code as well as versions for both 1.0 and 1.1 disk ROMs.

In the Hardware Hacking topic of the database, I posted a lengthy treatise on the subject of lightning protection as discussed on another SIG. SIGop Marty Goodman was also involved in this roundtable discussion. Kevin Darling uploaded a text file that describes a fix for the problems involved with the Tandy FD 502 second drive kit.

In the Games topic of the database, **Zack Sessions** (ZACKS) uploaded an *Othello* game for the CoCo 3, a *Blackjack* game, and a *Hammurabi* game. Zack also posted Mike Ward's routines for putting the ROM pack game *Springster* on disk. John Barrett posted a *Star Frontiers* character sheet utility.

In the Classic Graphics topic of the database, **Mark Garbarini** (F19) sent us his original drawings called *Pentagram* and *Tiger*. **Andy Duplay** (KB8BMN) uploaded a Hi-Res picture of a Bengal tiger, a conversion utility for MacIntosh pictures to *CoCo Max* format and several digitized female nudes.

In the Music and Sound topic of the database, Mike Stute sent us *The CoCo Cat Shuffle*, *Rainbow in the Dark*, and a short article about getting a better electric guitar sound from your synthesizer. **Tony Zamora** (TONYZAMORA) uploaded his *Musica 2* file converter, which produces stand-alone files from *Musica*'s `MUS` files. **George Hoffman** (HOFFBERGER) sent us three Pink Floyd songs for *Lyra*.

In the Product Reviews and Announcements topic of the database, **Eddie Kuns** (EDDIEKUNS) uploaded his review of *Data-Pack* versus *V-Term* from Gimmesoft. **Jim Goettig** (JGMG) posted an announcement about the CoBBS system for the CoCo 3.

That's it for this month. As you can see, there's plenty of good material available on the Rainbow CoCo SIG. Hope to see you all online! □

Make sure to press CTRL-Z after the last line to save the file. Great! Now we have two files in Workspace. And we can get down to learning a little more about how to manipulate files in Workspace.

Moving Files Around

First, let's try copying files with the `COPY` command. Enter `COPY TEST1.TXT TESTCOPY.TXT`. When you do a directory, you will see the new file `TESTCOPY.TXT` as an entry. The `COPY` command makes an exact duplicate of the first filename listed in the command line and calls this new file by the second filename listed. Note that the command and each of the filenames are separated with spaces. Play around with this if you want before we move on to the `APPEND` command.

Putting 'em Together

There is a very quick way to combine two files in Workspace. Simply enter `APPEND` *filename1 filename2*. This command adds the text from *filename1* to the end of the text in *filename2*. When this is done, filename1 is unharmed — it has been neither deleted nor changed. The contents of *filename2*, however, have been changed. Not to worry, though. The original *filename2* is still intact. What happens is that Delphi makes a copy of *filename2* and adds the text from *filename1* to it. This new file has the same name as *filename2*, but a new version number. Let's give it a try.

Figure 2: Workspace Commands

- APPEND to File
- CATALOG Files
- COPY File
- COUNT Words
- CREATE File
- DELETE File
- DOWNLOAD File
- EDIT File
- EXIT
- HELP
- LIST File
- PUBLISH File
- PURGE Old Versions
- RENAME File
- SETTINGS
- SUBMIT File
- UNPROTECT File
- UPLOAD File
- KERMIT-Server
- Other Commands
- New Features

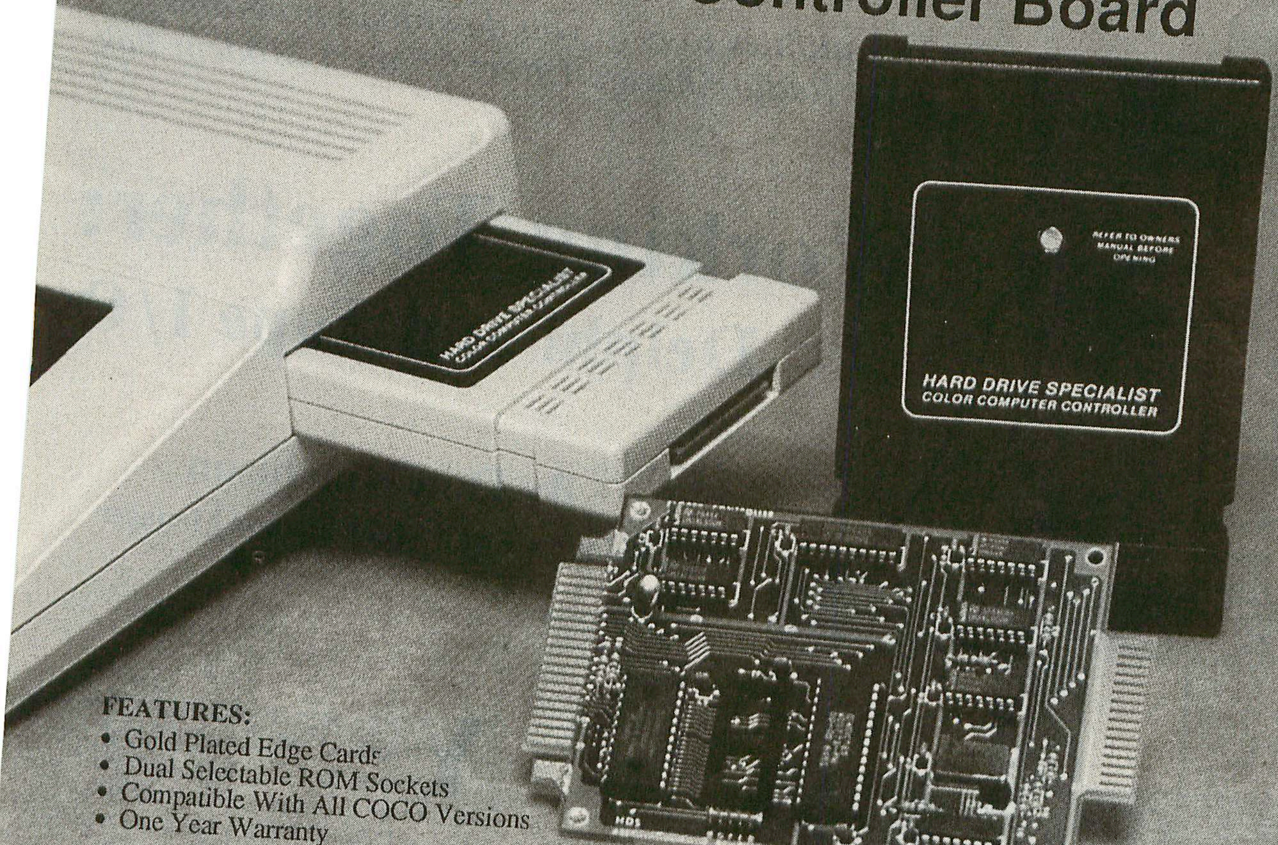
Enter `APPEND TEST2.TXT TESTCOPY.TXT`. After Delphi finishes its work, do a directory. You should see that the following files are now in your Workspace:

```
TEST1.TXT;1
TEST2.TXT;1
TESTCOPY.TXT;1
TESTCOPY.TXT;2
```

To find out what is in these files, we can use the list command. Simply enter `LIST`, followed by the name of the file you want listed. You don't have to include the version number if the file you want listed is the latest version. If, however, you want to see the contents of `TESTCOPY.TXT;1`, the original file, you will have to enter the version number. Commands in Workspace always default to the most recent version, i.e., the one with the highest version number.

That's about all we can cover this month. Next month I hope to give some coverage to some of the uses of files in Workspace. Can you imagine sending one letter to hundreds of people on Delphi at the same time without having to retype it every time? It's actually very easy to do, and we'll be discussing that next time. See you then!

New Low Prices! New Products!
HDS Floppy Drive Controller Board


REFER TO OWNERS MANUAL BEFORE OPENING
HARD DRIVE SPECIALIST
COLOR COMPUTER CONTROLLER
HARD DRIVE SPECIALIST
COLOR COMPUTER CONTROLLER
HDS

FEATURES:

- Gold Plated Edge Cards
- Dual Selectable ROM Sockets
- Compatible With All COCO Versions
- One Year Warranty

HARD DRIVE SPECIALIST has manufactured floppy drive controllers for the Color Computer for SIX years. Buy the controller alone to upgrade your present drive system, or purchase a complete drive 0 to get a high quality drive system loaded with features. This controller allows the use of either two 24 pin ROMS, or one 24 pin and one 28 pin ROM. Using this board with the standard Radio Shack ROM gives you 100% compatibility with all Radio Shack software.

Completed and Tested Board with ROM (includes Case and DOS instructions)	**$99.**
Completed and Tested Board without ROM (includes case)	**$79.**
Bare Board with Instruction Manual.	**$30.**
Parts Kit for Bare Board without ROM	**$30.**
Radio Shack ROM (current version)	**$30.**
Double Sided Compatible ROM	**$20.**
NEW!	
Magnavox 8CM515 Monitor with Cable for COCO-3	**$289.**

NEW!

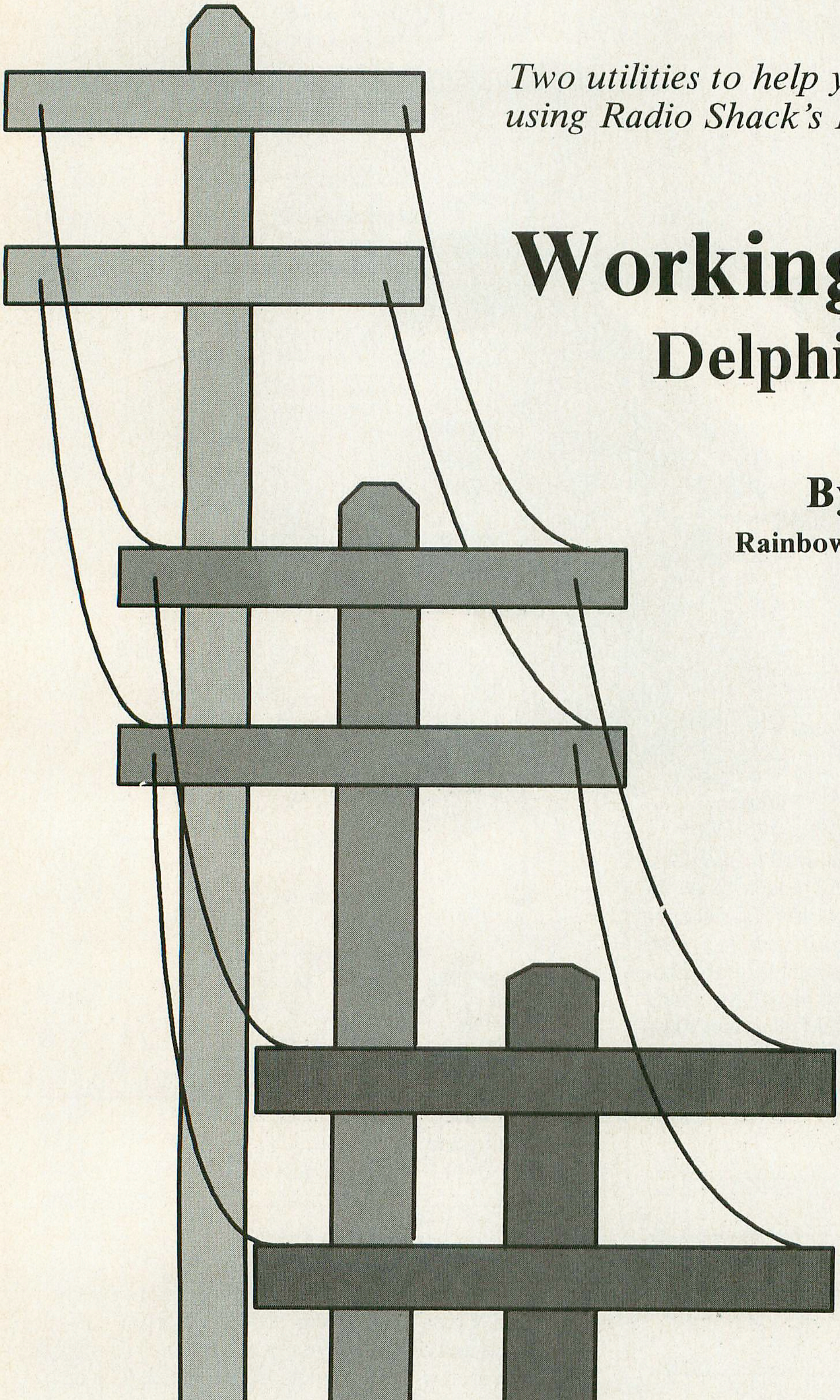
	5.25 inch	3.5 inch
Drive 0 Complete	**$169.**	**$185.**
Drive 1 Complete	**$119.**	**$134.**
Drive 0&1 Dual Drive Complete	**$259.**	**$289.**
Bare Drive	**$85.**	**$100.**

Drive Kits are complete with half height double sided drives mounted in a case with power supply. Drive 0 kits also include cable and controller with ROM. 3.5 inch drives yield 720K when used with appropriate DOS (ADOS, 0S9, etc.)

Ordering Information: Use our WATS line to place your order via VISA, MasterCard, or Wire Transfer. Or mail your payment directly to us. Any non-certified funds will be held until proper clearance is made. COD orders are welcome as well as purchase orders from government agencies. Shipping costs are available upon request. If you are not satisfied with your purchase within 30 days, you may return product for full refund excluding shipping costs.

☛ ORDER TODAY!!
HARD DRIVE SPECIALIST

16208 Hickory Knoll ■ Houston, Texas ■ 77059
1-713-480-6000 ■ 1-800-231-6671 EXT 437



Two utilities to help you download programs using Radio Shack's Direct Connect Modem Pak

Working Together:
Delphi and Tape I/O

By Don Hutchison
Rainbow CoCo SIG Database Manager

You've got a Radio Shack Direct Connect Modem Pak, and you want to know how to use it to download programs from the CoCo SIG on Delphi? Great! Let's see what's involved.

It's a good idea to be familiar with some of the terminology that we'll be using. Refer to the article "Getting Started with Delphi" in the November '87 issue of THE RAINBOW for a beginner's tour of Delphi. For continuing information about Delphi, Cray Augsburg's monthly column "Delphi Bureau" is virtually required reading.

To sign up with Delphi, locate the directions in the Delphi ad in RAINBOW for finding your local Telenet or Tymnet access number, then call Delphi through one of these services, using your CoCo and your Modem Pak. (Refer to your Modem Pak's manual for instructions on how to connect with these services.) Follow the easy prompts and messages to sign up.

Don Hutchison is an electrical engineer and lives in Atlanta, Georgia. He works as a senior project engineer involved in the design of industrial control systems. On Delphi, Don is the Database Manager of the RAINBOW CoCo SIG. His Delphi username is DONHUTCHISON.

After your Delphi account is approved (this can take less than 24 hours if you have an approved credit card), you're ready to enjoy the goodies in the CoCo SIG's databases. Sign on to Delphi, and then type `GROUPS COCO` to get to the Rainbow CoCo SIG. Your Delphi Guide will give you instructions about how to get to the databases in the CoCo SIG.

The terminal program in the Modem Pak is capable of transferring any standard CoCo file between your CoCo and other CoCos or mainframe computers using the Xmodem protocol. For our purposes, we'll assume you are using a cassette system, although the Modem Pak can also be used with a disk-based system if you use a Multi-Pak. Version 2.0 and higher of OS-9 also have special drivers furnished for use with the Modem Pak.

Since Xmodem is an 8-bit protocol, the Modem Pak's communications parameters must be set up for 8 bits, no parity, and one stop bit before a file transfer is initiated. It is recommended that you use these parameters to call Delphi, since the Modem Pak doesn't automatically adjust to these parameters when it starts an Xmodem transfer. While it is possible to access Delphi at 7 bits and even parity, you'll have to change your communications parameters manually before starting a download.

After you have looked through the database (using the `DIR` and `READ` commands) for programs or files that you may be interested in downloading, it's time to do an actual Xmodem download. Don't let it frighten you, because most of the process is automatic — the hard part is waiting to get the program so you can use it!

Enter the `READ` command to start things moving. Suppose you want to download a game called *Yahtzee*. At the main prompt, CoCo SIG>, enter `DATA GAMES`. This will place you in the Games topic of the database. Now type `READ YAHTZEE`. You'll be given a description of the program, and then the screen will display the ACTION> prompt and wait for you to tell it what to do. Since you have decided to download the program, just enter `XM` for Xmodem Download. When Delphi has the information ready for you, it will send a message saying, "OK, receive!" At this point, press the @ and 1 keys together; and the file transfer (download) will start. Delphi will notify you when the transfer is completed, at which point you should save your new download to tape. Didn't hurt at all, did it? Wasn't it *easy*?

The databases on the CoCo SIG contain many different types of programs: machine language programs, tokenized BASIC programs, graphics files and more. However, the Modem Pak's terminal program was designed for downloading ASCII BASIC programs only, and it doesn't provide for creating any other file type. This makes it impossible for a Modem Pak user to download and successfully use machine language programs without some help from elsewhere. Additionally, many users desire features that simply weren't included in the software for the Modem Pak. What to do?

> ***"When we say a program is 'tokenized' or 'compressed' BASIC, we mean that it's in the same form that would be created if you typed in a BASIC program from the keyboard and then entered*** `CSAVE` ***"filename"."***

No problem! Mike Ward has provided optional support for the Modem Pak when it's used with his popular terminal program, *MikeyTerm*. All that's needed is to run the companion program called *MTPAK*, which will adjust *MikeyTerm* to communicate with the Modem Pak. This step only needs to be done once.

What really happens is that *MikeyTerm* uses the modem portion of the Modem Pak only, bypassing the terminal software. This approach adds many useful and desirable features to a user's system; a CoCo 3 user will be especially pleased, because he will be able to access the 80-column mode of the CoCo 3 with *MikeyTerm*!

MikeyTerm features full buffer control for reviewing what you have read online. A search feature is also provided for quickly locating a selected string in the buffer. A block of the buffer may be marked and then saved to tape or printed. The most common default settings are configurable and are saved for fast startup. (No more setting up everything when you first execute the program.) *MikeyTerm* can a configured to support a compatible modem should you a one of those. Printer support is provided through the CoCo's standard serial port. Finally, forum or mail messages may be typed into the buffer of *MikeyTerm* and then uploaded when you're online. This will save you connect time charges, since you won't have to type everything while you're online.

MikeyTerm (in ASCII BASIC form) is available for downloading from the CoCo SIG's database using your Modem Pak, or it may be obtained directly from its author for the cost of media and handling. For *MikeyTerm* and full documentation, send $10 to:

Mike Ward
1807 Cortez
Coral Gables, FL 33134

(Please specify the tape version.) *MikeyTerm* supports all versions of the CoCo, and includes provisions for Xmodem file transfers. If you decide to upgrade to disk operation in the future, *MikeyTerm* also supports disk I/O in the same program.

The Xmodem protocol is in widespread usage these days on virtually all information services and BBSs. In addition, several terminal programs for the CoCo are available that support Xmodem for cassette users. Inherent in the Xmodem protocol is the ability to transfer binary files, and this created a rather severe problem for cassette users who attempted to download machine language programs or compressed (tokenized) BASIC programs created on a disk system. This is due to a simple incompatibility between the tape and disk file formats. Microsoft, the authors of the BASIC used by the CoCo, only provided for the free exchange of ASCII programs between tape and disk systems. The solution is simply a bit of specialized processing in order to get around the problem. Just for background, let's examine each of the file types.

Machine Language Programs

Specifically, machine language files on disk contain embedded control information that is not part of the actual program. This makes such files incompatible with cassette systems unless that control information is removed. Cassette users who have downloaded and tried to execute binary music files have experienced this problem.

A machine language file on disk is

stored as one large block, and looks something like this:

```
        Preamble
        Zero Byte
   # of Bytes to load
    Loading address
          Data
      Program body
        Postamble
        &HFF Byte
      2 Zero Bytes
   Execution address
```

However, a machine language program on tape contains a "namefile" block that precedes the machine language program, and it also contains the loading and execution addresses for the program. (BASIC determines the ending address of the machine language program by counting the number of bytes it loads.) The problem is that terminal programs only load the data blocks following the namefile block, so the receiving terminal program has no way of determining these addresses when it saves the received program to tape. To further compound the problem, the Xmodem protocol was never designed to handle this situation, so the tape user was in need of some specialized help. That help arrived over three years ago in the form of a program called TAPCNV.

TAPCNV is a machine language utility written by Mike Ward that will read a machine language cassette file created on a disk system and remove the disk control information. Once that is done, the file may be saved just like any other machine language file.

To create the machine language program TAPCNV, carefully type in and then run Listing 1. (Be sure to save the program first.) The machine language program will be poked into memory, and some checking is done to try to detect any typing errors. Then the program will ask you for a cassette, and it will save the machine language program for you.

To use the TAPCNV program, just load and execute it. It will prompt you to ready the cassette with the tape containing the binary file that you downloaded and wish to convert. When you strike a key, TAPCNV will read the cassette file and remove the disk control information. The converted file will be moved to its proper place in RAM. When the file has been converted, the start, end and execute addresses are displayed. At this point you may save the converted program to cassette by entering a command such as `CSAVEM "filename", &HStart, &HEnd, &HExec`.

Naturally, machine language programs that utilize disk functions will not work on a cassette system, but programs such as music files will now function as intended.

There are some files that TAPCNV simply can't handle, such as "segmented" files. For purposes of simplicity, consider segmented files to be program segments that must be loaded into different areas of memory. A tape format doesn't exist for segmented files, nor is it possible to create such files from BASIC. Segmented files occur regularly on disk systems, however; Disk BASIC can handle them efficiently.

The BASIC version of the TAPCNV program may also be downloaded from the Utilities topic of the CoCo SIG's database on Delphi, and the assembly language source code for TAPCNV may be found in the Source code topic of the database.

Now, since you have TAPCNV but not *MikeyTerm* (yet), can you use the Modem Pak to download machine language programs from Delphi? Sure! We'll have to modify TAPCNV first, in order to remove some checking that "TAPCNV" does to make sure that it is "fixing" a machine language file.

A simple modification to TAPCNV will disable the checking. Just enter `CLOADM "TAPCNV"`, then enter from the keyboard:

```
POKE &H6DE,&H21 : POKE
&H6E5,&H21
```

These pokes make TAPCNV ignore the file type of the source program. Normally, TAPCNV requires a binary file and will cease execution if the filetype isn't binary. These pokes modify some of the "error trapping" features of the program, so they are provided on a "use at your own risk" basis.

Tokenized BASIC

When we say a program is "tokenized" or "compressed" BASIC, we mean that it's in the same form that would be created if you typed in a BASIC program from the keyboard and then entered `CSAVE "filename"`. What BASIC will do is replace keywords like `PRINT` or `PAINT` with one character, or "token." Since several characters are replaced with a single character, the term "compressed" BASIC was born. The word "tokenized" is probably more appropriate.

BASIC does this in order to save space and to make program execution faster. Every time BASIC encounters a token, it executes code that already exists in your computer. Whenever you have a BASIC program in your computer, it exists in tokenized format.

The only other way to store a BASIC program is in ASCII format, which you can do by typing `CSAVE "filename",A`. The `A` at the end of that line is what tells your computer to save the program to tape in ASCII (or "text") format. When we say ASCII and/or text, we mean the type of characters you see on the screen when you tell BASIC to list a program.

You might experiment with a few of your programs. Take a BASIC program you've saved to tape, and load it into *MikeyTerm*'s buffer. Then view the buffer — you'll see all sorts of colored blocks and some characters mixed in, too. Then take a BASIC program that's been saved in ASCII format (`CSAVE "filename",A`) and load it into the buffer. When you view the buffer this time, you'll be able to read everything there.

A problem similar to the one involving machine language files causes tokenized BASIC files originating on a disk system to be incompatible with tape systems. BASIC programs saved on disk contain a 3-byte preamble that is not part of the actual program. (Disk BASIC uses this information to determine the size of the BASIC program before loading.) This preamble is not present on BASIC programs on cassette, and it makes such files incompatible with cassette systems unless it is removed. Cassette users who have downloaded and tried to use compressed BASIC files created on a disk system (such as those in the Rainbow topic of the CoCo SIG's database) have repeatedly encountered this problem.

Following Mike Ward's lead, I wrote a utility program to assist tape users with tokenized BASIC programs. BASFIX is a utility that will read a tokenized BASIC cassette file originating on a disk system and remove the control information. It will then prompt the user to save the program to cassette.

BASIC programs utilizing disk functions will still not work on a cassette system, but programs such as the RAINBOW ON TAPE files in the CoCo SIG's database will now be accessible to tape users. In fact, BASFIX was originally written for use with *MikeyTerm* in order to get around the problem of tokenized BASIC programs and cassette users.

BASFIX is compatible with the CoCo 1, 2 and 3. If a CoCo 3 is in use, the screen will default to the 32-column mode automatically, and the processor speed will be adjusted to the normal 0.89-MHz clock rate so that the file may be loaded correctly from tape.

To create the machine language program BASFIX, carefully type in and then run Listing 2. (Be sure to save the program first.) The machine language program will be poked into memory, and some checking is done to try to detect any typing errors. Then the program will ask you for a cassette, and it will save the machine language program for you.

To use the BASFIX program from that point on, simply load and execute it. It will prompt you to ready your cassette player with the tape containing the binary file you downloaded and wish to convert. When you strike a key, BASFIX will read the cassette file and remove the preamble. The converted file will be moved into RAM just as if you had entered PCLEAR 1 and then CLOADed the program. At this point, you will be prompted to CSAVE the converted program to cassette. From then on, the program may be treated just as any other BASIC program from tape.

Note that BASFIX requires that the cassette file containing the BASIC program has been saved in binary format. This is a technical limitation; it was done to prevent several problems that might occur with an ASCII save of the file, since BASIC actually does a LIST to tape when the ASCII option is used. This procedure could result in extremely long program lines being truncated.

If you are using *MikeyTerm*, simply choose Option 2 (Binary save) from the cassette menu. When prompted for the start and execution addresses, you may simply press ENTER in response to the prompts.

BASFIX is entirely position-independent and may be loaded anywhere in RAM. However, it is strongly recommended that the program be executed at its intended location in order to provide maximum memory for the converted BASIC program.

The BASFIX utility program (in ASCII BASIC form) may be downloaded from the Utilities topic of the CoCo SIG's database. The assembly language source code for BASFIX may be found in the Source topic of the database. The source code is written for the MACRO 80C assembler and is listed under the name of BASFIX.SRC.

The TAPCNV and the BASFIX programs, their source code files, and their documentation files are copyrighted by their respective authors. However, they may be freely shared with any and all CoCo users and included in club libraries as long as no fee is charged for the program(s). (A small charge for the media and/or xeroxing fee for the documentation is perfectly OK.)

Feel free to contact either me (Delphi username DONHUTCHISON) or Mike Ward (Delphi username MIKEWARD) with any questions you may have concerning these two utilities. See you on Delphi, and enjoy downloading! ☐

Listing 1: TAPCNV

```
1 CLS
2 IF PEEK(&HC000)=68 THEN PRINT"
DO NOT RUN THIS ON A DISK SYSTEM
":END
3 PRINT@194,"GENERATING MACHINE
LANGUAGE"
4 FOR X=&H600 TO &H92C
5 READ H$:POKE X,VAL("&H"+H$)
6 NEXT
7 PRINT:PRINT"PREPARE CASSETTE T
O SAVE TAPCNV"
8 PRINT"PRESS ANY KEY WHEN READY
."
9 IF INKEY$="" THEN 9
10 CSAVEM"TAPCNV",&H600,&H92C,&H
600
11 PRINT:PRINT"TAPCNV SAVED!":PR
INT
12 END
13 DATA 7F,FF,40,6F,8D,3,29,6F,8
D,3,24,8E,0,0,AF,8D,3,1F,30,8C,E
B,30,89,FD,FF,AF,8D,3,16,30
14 DATA 8D,4,16,AF,8D,3,10,BD,A9
,28,8E,4,45,9F,88,17,2,B6,54,41,
50,45,20,43,4F,4E,56,45,52,54
15 DATA 20,55,54,49,4C,49,54,59,
0,8E,4,82,9F,88,17,2,99,52,45,41
,44,59,20,54,41,50,45,20,54,4F
16 DATA 20,42,45,20,43,4F,4E,56,
45,52,54,45,44,0,8E,4,C9,9F,88,1
7,2,76,50,52,45,53,53,20,41,4E
17 DATA 59,20,4B,45,59,20,0,BD,A
1,B1,81,3,26,1,39,BD,A9,28,96,68
,A7,8D,2,9D,86,FF,97,68,C6,1
18 DATA BD,A9,9E,CC,0,F,8E,1,DA,
A7,80,5A,26,FB,30,8D,2,83,17,2,4
8,8E,1,DA,9F,7E,BD,A7,1,DA
19 DATA 7C,26,F9,86,46,B7,4,0,B6
,1,E2,A7,8D,2,6B,86,80,B7,1,E2,8
E,1,DA,17,2,25,A6,8D,2,5C
20 DATA B7,1,E2,BD,A7,E9,B6,1,E2
,81,2,10,26,1,E8,7D,1,E3,10,26,1
,E1,30,8D,2,4B,34,10,BD,A7
21 DATA 7C,35,10,9F,7E,BD,A7,B,1
0,26,1,B0,6D,8D,2,2F,27,E,AC,8D,
2,2F,22,8,AC,8D,2,27,10,22
22 DATA 1,30,D6,7D,6D,8D,2,19,26
,39,63,8D,2,13,6D,8D,2,17,10,26,
1,52,33,8D,2,F,10,AE,43,10
23 DATA AC,8D,2,3,25,9,10,AC,8D,
1,FE,10,25,1,5,10,BF,1,E7,33,45,
34,4,C0,5,1F,21,3A,A6,C0
24 DATA A7,A0,5A,26,F9,35,4,34,1
0,AE,8D,1,DA,3A,AF,8D,1,D5,35,10
,96,7C,81,FF,26,8F,34,10,BD,A7
25 DATA E9,BD,A9,74,35,10,6D,8D,
1,BE,26,52,C6,FF,1F,12,EE,3B,11,
83,FF,0,27,3D,EE,8D,1,AD,33,5F
26 DATA EF,8D,1,A7,31,3F,5A,26,E
9,17,1,54,D,D,55,4E,41,42,4C,45,
20,54,4F,20,44,45,54,45,52,4D
27 DATA 49,4E,45,D,45,58,45,43,2
0,41,44,44,52,45,53,53,0,86,FF,A
```

```
7,8D,1,75,20,9,6D,3D,26,BF,AE
28 DATA 3E,BF,1,E5,A6,8D,1,63,97
,68,6D,8D,1,60,27,1,39,31,8D,0,4
8,F6,1,E7,17,1,22,F6,1,E8
29 DATA 17,1,1C,31,8D,0,52,F6,1,
E5,17,1,12,F6,1,E6,17,1,C,EC,8D,
1,3A,83,0,A,FE,1,E7,33
30 DATA CB,33,5F,1F,30,34,4,1F,8
9,31,8D,0,22,17,0,F1,35,4,17,0,E
C,17,0,D0,D,D,53,54,41,52
31 DATA 54,20,24,20,20,20,20,20,
20,D,45,4E,44,20,20,20,24,20,20,
20,20,D,45,58,45,43,20,20,24,20
32 DATA 20,20,20,D,0,39,17,0,A3,
D,4E,45,58,54,20,42,4C,4F,43,4B,
20,57,49,4C,4C,20,4F,56,45,52
33 DATA 2D,57,52,49,54,45,D,54,4
8,49,53,20,50,52,4F,47,52,41,4D,
D,0,86,FF,A7,8D,0,BD,16,FE,EE
34 DATA 17,0,6D,D,46,49,4C,45,20
,44,49,44,20,4E,4F,54,20,4F,52,4
9,47,49,4E,41,54,45,D,4F,4E,20
35 DATA 41,20,44,49,53,4B,20,53,
59,53,54,45,4D,D,0,86,FF,A7,8D,0
,87,16,FE,B8,17,0,37,D,54,41
36 DATA 50,45,20,49,2F,4F,20,45,
52,52,4F,52,D,0,86,FF,A7,8D,0,6A
,16,FE,9B,17,0,1A,D,4E,4F,54
37 DATA 20,41,20,4D,2F,4C,20,46,
49,4C,45,D,0,86,FF,A7,8D,0,4D,16
,FE,7E,35,10,A6,80,27,5,BD,A3
38 DATA A,20,F7,6E,84,A6,84,84,7
F,BD,A3,A,6D,80,2A,F5,39,34,10,3
0,8D,0,16,34,4,54,54,54,54,8D
39 DATA 9,35,4,C4,F,8D,3,35,10,3
9,A6,85,A7,A0,39,30,31,32,33,34,
35,36,37,38,39,41,42,43,44,45
40 DATA 46,53,A0
```

Listing 2: BASFIX

```
1 CLEAR 200,&H7FFE:CLS
2 IF PEEK(&HC000)=68 THEN PRINT
"DO NOT RUN THIS ON A DISK SYSTE
M":END
3 PRINT@105,"LOADING basfix":L=1
7:SA=&H600
4 CK=0:L=L+1
5 FOR I=1 TO 32
6 READ H$:IF H$="X" THEN 15
7 PRINT@206,HEX$(SA)
8 X=VAL("&H"+H$):POKE SA,X
9 CK=CK+X:SA=SA+1
10 NEXT I
11 READ I
12 IF I=CK THEN 4
13 PRINT:PRINT"  CHECKSUM ERROR
 IN LINE";L
14 STOP
15 PRINT:PRINT"BASFIX IS LOADED.
 READY CASSETTEAND PRESS <enter>
... ";
16 LINEINPUT A$:CSAVEM"BASFIX",&
H600,&H98E,&H600
17 PRINT:PRINT "ALL FINISHED!":E
ND
18 DATA 6F,8D,2,88,6F,8D,2,83,BE
,FF,FE,8C,A0,27,27,9,7F,FF,D8,F,
E7,AD,9F,E0,2,17,2,5F,17,2,41,20
,3505
19 DATA 20,20,20,42,41,53,49,43,
20,43,4F,4E,56,45,52,53,49,4F,4E
,20,55,54,49,4C,49,54,59,D,D,D,5
2,45,2042
20 DATA 41,44,59,20,54,41,50,45,
20,54,4F,20,42,45,20,43,4F,4E,56
,45,52,54,45,44,D,41,4E,44,20,50
,52,45,2115
21 DATA 53,53,20,41,4E,59,20,4B,
45,59,20,0,BD,A1,B1,81,3,26,1,39
,17,2,4,86,53,B7,4,0,96,68,A7,8D
,2477
22 DATA 2,8,86,FF,97,68,17,1,24,
30,8D,2,2,9F,7E,CC,0,F,A7,80,5A,
26,FB,AD,9F,A0,4,AD,9F,A0,6,17,3
102
23 DATA 0,FD,D6,81,DA,7C,26,EF,1
7,1,B5,46,20,0,A6,8D,1,E5,34,2,8
6,80,A7,8D,1,DD,30,8D,1,D1,17,1,
3328
24 DATA AD,35,2,A7,8D,1,D0,17,0,
D5,A6,8D,1,C9,81,2,10,26,1,3C,6D
,8D,1,C0,10,26,1,34,AD,9F,A0,4,2
782
25 DATA 30,8D,1,AB,9F,7E,AD,9F,A
0,6,10,26,1,12,6D,8D,1,99,26,36,
63,8D,1,93,31,8D,1,93,63,A4,6D,A
0,2971
26 DATA 10,26,0,CD,EC,A1,ED,8D,1
,83,C3,C,0,9E,17,30,89,FF,0,34,1
0,10,A3,E1,10,22,1,C,D6,7D,C0,3,
3063
27 DATA 8E,C,1,A6,A0,A7,80,5A,26
,F9,96,7C,81,FF,26,B4,8D,6D,8D,7
6,A6,8D,1,52,97,68,6D,8D,1,4E,27
,1,3552
28 DATA 39,7F,C,0,CC,C,1,DD,19,E
3,8D,1,40,83,0,1,DD,1B,9E,19,EC,
84,27,C,33,4,A6,C0,26,FC,EF,84,3
148
29 DATA AE,84,20,F0,9E,27,9F,23,
9E,19,30,1F,9F,33,9E,1B,9F,1D,9F
,1F,8E,1,A9,9F,B,F,2D,F,2E,F,8,1
7,2653
30 DATA 0,DE,D,D,53,41,56,45,20,
50,52,4F,47,52,41,4D,20,54,4F,20
,54,41,50,45,20,4E,4F,57,D,0,39,
1C,2018
31 DATA AF,B6,FF,21,84,F7,B7,FF,
21,39,4F,20,6,C6,1,8D,F,86,8,A7,
E2,B6,FF,23,84,F7,AA,E0,B7,FF,23
,39,4334
32 DATA CE,FF,1,8D,0,A6,C4,84,F7
,57,24,2,8A,8,A7,C1,39,17,0,8C,D
,46,49,4C,45,20,44,49,44,20,4E,4
F,2926
33 DATA 54,20,4F,52,49,47,49,4E,
41,54,45,20,4F,4E,D,41,20,44,49,
53,4B,20,53,59,53,54,45,4D,D,0,2
0,58,2038
34 DATA 8D,5E,D,49,2F,4F,20,45,5
2,52,4F,52,D,0,20,48,8D,4E,D,4E,
4F,54,20,41,20,42,49,4E,41,52,59
,20,2077
35 DATA 46,49,4C,45,D,0,20,30,8D
,36,D,4E,4F,54,20,45,4E,4F,55,47
,48,20,4D,45,4D,4F,52,59,2E,2E,2
E,D,1972
36 DATA 43,4F,4C,44,2D,53,54,41,
52,54,20,26,20,54,52,59,20,41,47
,41,49,4E,D,0,86,FF,A7,8C,2F,16,
FE,D0,2714
37 DATA 35,10,A6,80,27,6,AD,9F,A
0,2,20,F6,6E,84,A6,84,84,7F,AD,9
F,A0,2,6D,80,2A,F4,39,C6,60,8E,4
,0,3493
38 DATA 9F,88,E7,80,8C,6,0,25,F9
,39,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,1143
39 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0
40 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0
41 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0
42 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0
43 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0
44 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0
45 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0
46 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0
47 DATA "X"
```

Hard Disk Mania Sweeps America!

Experts Blame "Incredibly Sane" Low-Cost, High-Performance Interface

This year, 1988, may go down in CoCo history as "The Year of the Hard Disk". Burke & Burke has provided hundreds of low-cost, high performance hard disk interfaces to a very hot Color Computer market in only six months!

Hire a Veteran Today.

The CoCo XT hard disk interface from **Burke & Burke** lets you connect up to 2 low cost, PC compatible 5-120 Megabyte capacity hard drives to your CoCo. You buy the drive, Western Digital WD1002-WX1 or WD1002-27X (RLL) controller, and a case from the PC dealer of your choice. Just plug them into the CoCo XT, plug the CoCo XT into your Multi-PAK, and you have a 20 Meg OS9 hard disk system for **under $450!**

Great for multi-user systems! The CoCo XT interface uses advanced "NO HALT" hard disk controllers, which do not halt your CoCo and do not disable or use interrupts during hard disk access. You get full type-ahead, and the system clock does not lose time during hard disk access. Fully compatible with most RS-232 expansion ports!

CoCo XT (with anodized housing, 60 page user manual, hard disk back-up utility and new, Version 2.1 drivers for use with both OS9 & HYPER-I/O) -- $69.95. Or choose the **CoCo XT-RTC** (includes real-time clock / calendar with battery backup) -- $99.95

THE PROFESSIONAL TOUCH: XT-ROM – Automatically boots and reboots OS9 from hard disk. Installs in your hard disk controller's BIOS ROM socket – $19.95.

Now: Hard Disk for BASIC

"Dynamic Disk Interface" runs hard drives, big floppies, and more!

You or someone that you know may have the 35 Track Blues. It strikes hundreds of CoCo users every year. One day you wake up, and say to yourself, "These 35 track floppy disks are just too small."

There's only one cure. More storage. Get it. With HYPER-I/O, from Burke & Burke.

BASIC for the '90's

HYPER-I/O modifies the RS-DOS Disk BASIC in your CoCo 1, 2, or 3 to provide a "Dynamic Disk Interface". Use your existing BASIC and RS-DOS software with hard disk interfaces (CoCo XT, DISTO), RAM Disks, and any mix of floppy drives from 160K to 720K each. Fully RESET protected, user configurable, expandable, OS9 compatible, EPROM-able HYPER-I/O may soon be **THE** system of choice for the CoCo 1, CoCo 2, and CoCo 3. **HYPER-I/O Version 2.5** now available for only $29.95.

HYPER-III (RAM Disk and Print Spooler for CoCo 3 HYPER-I/O) –$19.95

"Instant Guru" Department

Tools to let you spend less time fighting OS9, and more time using it.

Wild & MV Version 2.0 Use "wildcards" with most OS9 commands, or rearrange your directory tree. Features recursive directory searches. A hard disk must! $19.95

EZGen Version 1.02 Powerful OS9 bootfile editor. Change module names, add or delete modules, patch bytes, or rearrange modules. Works on other files, too. $19.95

Daggorpatch If you own Dyna Micro's Dungeons of Daggorath™ cartridge, this program will convert it to run from disk! Adds disk load and save, quit, screen print, repeat last command, pause, and more. HYPER-I/O and RS-DOS compatible. $12.95

R. S. B.

We broke out the champagne. It was revolutionary! Who ever thought you could run BASIC, in an OS9 window?

Everyone knows that BASIC and OS9 are incompatible. The commands are completely different. The floppy disks are completely different. BASIC programs won't run under OS9.

Future Shock

Some people say that they "hate" OS9. Many people who buy OS9 don't use it, because it's unlike anything they've ever seen before. Well, like it or not, Level 2 OS9 is the future of the CoCo. Even the newest games use OS9 now.

Burke & Burke has developed a new program, RSB, to help you take that first step towards falling in love with Level 2 OS9.

BASIC Clone?

The first time you run RSB, it copies your RS-DOS ROMs to an OS9 disk file. Our proprietary installation software converts this disk file to an OS9 "shell" that can be run like any other OS9 program. You can even program the CoCo to automatically use RSB as your "shell" whenever you start up OS9.

RSB won't run machine language programs, but you can use all of the familiar Super Extended BASIC™ commands and program statements. You can even take advantage of OS9's built-in "windows" to run several BASIC programs at once! And RSB runs at the full 2 MHz speed of the CoCo -- always.

If you have a Speech Sound PAK™, or a Super Voice™, RSB upgrades will allow you to use these devices to execute commands like PLAY and SOUND "NO HALT".

Break out the champagne. Break out the OS9. Break out **RSB** . $39.95

Burke & Burke

P.O. Box 1283 Palatine, IL 60078-1283 (312) 397-2898

MasterCard VISA

ILLINOIS RESIDENTS PLEASE ADD 7% SALES TAX. COD's add $2.20. Shipping (within the USA) $2.00 per CoCo XT; $1.50 per disk or ROM. Please allow 2 weeks for delivery (overnight delivery also available for in-stock items). Telephone orders accepted (312) 397-2898.

RAINBOW CERTIFICATION SEAL

COCO Q&A CONSULTATIONS

By Marty Goodman
Rainbow Contributing Editor

In this and in future "CoCo Consultations," I will be trying something new. In addition to the familiar Q & A column, I will also include tidbits of information contributed by various folks and, in some cases, comment on the information. Thus, even if you don't have a question, *I invite you to send in any little hints or descriptions of experiences you have had with the CoCo that you think might be of interest to the CoCo-owning public in general.*

'Sparklie' Solutions

I've been following your discussion of the problem of "sparklies" on the screen when using a Color Computer 3 under OS-9. What can you say to summarize what you know of the problem and its cure?

Daivd Barns
(GLENSIDE)
Glenside, IL

It is true that some CoCo 3s show tiny flashes on the screen, especially under OS-9 and during disk I/O. The "sparklie" problem varies considerably from machine to machine. Some do not seem to have it; others are seriously plagued by it — to the point that the sparklies occur even during Disk BASIC. Sometimes the problem develops after installation of a given brand of 512K upgrade. The sparklie problem appears to be a very subtle timing problem in dynamic RAM addressing. It also appears to vary with the particular issue of GIME chip in the machine, the particular make and model of DRAM chip used for the 512K upgrade, and the heat of the machine. Sometimes the sparklie problem appears only after 20 minutes or more, when the machine has warmed up.

There are primarily two routes to try to fix the problem. Both involve significant expense and/or hardware effort. First, several folks have reported that the sparklie problem is cured by replacing the 68B09 chip in the CoCo 3 with its CMOS cousin, the Hitachi 6309 chip. Unfortunately, this option is limited to skilled hardware hackers. The 68B09 is soldered into the CoCo 3, so you must carefully desolder that 40-pin chip, install a socket, and then obtain and insert the 6309 chip. Such desoldering is rather delicate, and you run the risk of damaging traces to the 68B09 on both sides of the PC board.

The second fix is to replace your GIME chip with a newer model. The older GIME chips are marked copyright 1986. The newer ones are marked copyright 1987. Also, the new GIME chip is named TCC 1014A, whereas the old one is named TCC 1014. Replacing the GIME chip is a delicate process unless you have very specialized tools. It is easy to damage the contacts on the GIME chip or on the socket, or to damage the socket itself. Attempt this replacement only if you know what you are doing, and proceed with great care. Tandy is currently asking $50 for a new GIME chip, which I think is unreasonably high.

Customized Layout for the CoCo

I am considering putting a CoCo system in an IBM PC-type case. I am contemplating building an expansion board and manually switching +5 volts to each of the various ROMs that might be in cartridges. What do you think of this plan?

F.G. Swygert
APO Armed Forces

Don't try it! A Multi-Pak interface is essential for proper operation of a multislot system, for reasons entirely unrelated to slot selection. First of all, if you put more than half an inch of 40 conductor ribbon cable on the CoCo system bus, your machine will either not run at all or be unreliable.

In addition to slot selection, the Multi-Pak provides TTL buffers on all address and data lines. Those buffers are needed, for the naked output lines of the 6809 cannot be fanned out unamplified to three or four extra cards without causing the machine to either crash or operate very unreliably. Your plan to fan out the bus of the CoCo without using buffers would not work.

Finally, an IBM PC-type box is a relatively poor choice for repackaging a custom CoCo because it is the wrong shape. In order to shoehorn an extensive CoCo system into such a box, you'd have to use signficant lengths of ribbon cable on the 40 conductor system bus. That, as I noted above, is unacceptable. Frankly, having done such a repackaging job several times myself, I really urge you to abandon the idea entirely. It is *not* in my opinion worth the effort.

The same effect can be achieved far more easily by merely mounting a CoCo and Multi-Pak off to the side of, above, or below your work area, and then putting the keyboard at the end of an extender cable and into a case for placement on your work area or (for the sake of your back) on your lap. I make such a cable for use by tinkerers and do-it-yourselfers; it is sold by Microcom Software. It also has provisions for a remote reset and power-on light. For about twice the price, HJL sells what appears to be an excellent package that includes a plug-in keyboard cable, an extremely well-designed remote keyboard case, and one of its excellent CoCo replacement keyboards. I'd recommend my system to those who want

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

to save a little by making their own keyboard case, and HJL's to those who prefer to buy something that plugs right in and can be immediately used.

In any case, whether you buy my cable, HJL's system, or make up your own extension keyboard cable, leave the CoCo + Multi-Pak + plugged-in cards setup alone, and put it out of the way via an extension keyboard. In my opinion, this is by far the best approach to customizing your CoCo's physical layout for more convenient operation.

FD 502-Related OS-9 Crashes

See pg 184

The FD 502 series drive is wired up in a peculiar way, rather differently from any of the preceding drive units from Tandy for the CoCo. With all other drive systems from Tandy, when you accessed any one drive, all the drive motors were turned on. With the FD 502 system, if you have two drives, when you access any one of them the other drive motor is not turned on. In this respect, the FD 502 works like the drives on an IBM PC. But this causes serious problems with OS-9 in operations where a user is copying from one drive to another. OS-9's driver software does not wait for the second drive to come up to speed because it "thinks" that the drive's motor was already turned on at the time the first drive was accessed. The result is occasional crashed disks due to the drive starting to write before the head has come up to speed. I understand Tandy may release patches for the OS-9 disk drivers to correct this problem. The patches would contain code that pauses for a fraction of a second each time a new drive is selected to wait for the motor on that drive to come up to speed.

Kevin Darling
(KDARLING)
Raleigh, NC

Thanks for alerting us to this potential problem, Kevin. Note that knowledgeable hardware hackers should be able to carefully check out the wiring of the motor-on and drive select lines in the FD 502 and redo the wiring so that all motors in the system do go on when any one drive is accessed. Though I have not looked much inside the FD 502, I would imagine the problem is that, as delivered, the motor-on line and the drive select line are tied to the same pin, or linked logically so that the motor-on signal will only be seen as valid if the drive in question is also selected. A bit of hacking should be able to cure this, if the hackers know what they are doing.

Note, also, that the FD 502 will also have similar problems with Disk Extended BASIC: Programs that do two-drive operation, particularly disk backup operation, will result in occasional crashed sectors on an unmodified FD 502 drive system, for the same reasons there are problems with it under OS-9. These problems will be disastrous, but sufficiently infrequent as to be maddening to someone looking for the cause.

It is also interesting to me that this very subtle problem is extremely similar to an equally subtle problem that I christened the "head settle bug," which plagues owners of drives that have head solenoids. Many years ago I described this bug and a patch to the Disk BASIC ROM for it in the magazine *HOT CoCo* — one of the first CoCo articles I ever wrote. I now recommend that any owners of older head solenoid drives disable that function by merely selecting the HM options, which keeps the head down all the time.

From ROM Pack to Disk

How can I put the ROM packs Thexder *and* Shanghai *on disk? I am tired of plugging and unplugging my disk controller whenever I want to play the games, and all the available slots in my Multi-Pak are used up with OS-9-related hardware.*

Dennis McMillian
Pittsburg, CA

First, you need to know how to transfer the "raw file" from the ROM pack to tape. *This* is accomplished by first putting a tiny piece of tape *only* over Trace 8 on the ROM pack. Trace 8 will be the first pin you encounter on the underside of the ROM pack, near (but on the *opposite* surface of the edge connector) that one slightly shortened trace. Note that traces 2, 4 and 6 are missing on these ROM packs, so Trace 8 is the first one you encounter. Cover this and *only* this trace with a bit of frosted "magic tape."

Now, with the power off, plug in the ROM pack and then turn the power on. The pack will now *not* autoexecute because of the covered trace, so you will be greeted by the ordinary Extended BASIC sign-on message. Now type `POKE &HFFDE,0` and press ENTER. Connect your cassette tape recorder and save contents of the the ROM pack to disk using the command `CSAVEM "`*filename*`", &HC000, &HFEFF, &HA027`. The *filename* can be `THEXDER` or `SHANGHAI`, whichever one you are working on.

Now turn the power off, remove the ROM pack, and replace it with the disk controller. Power up again.

For *Shanghai*, load the tape into your Disk BASIC system using the command `CLOADM"SHANGHAI", &H7000` and press ENTER (assuming you named the cassette file as `SHANGHAI`, of course). This command will offset-load the data into lower RAM memory. Now modify the data by entering this:

```
POKE &H303C, &H7E
POKE &H303D, &H30
POKE &H303E, &H56
```

Now save the data to disk as follows:

```
SAVEM "SHANGHAI", &H3000,
&H6EFF, &H3000
```

You'll now have a disk file of *Shanghai* that you can load and execute.

For *Thexder*, load the tape using the command `CLOADM "THEXDER", &H6000` (assuming you named the cassette file as `THEXDER` when you saved it to cassette). Modify the data by entering the following:

```
POKE &H20BF, &H20
POKE &H20C0, &H0F
POKE &H2102, &HDF
POKE &H2104, &H20
POKE &H4BB5, &H50
POKE &H4BE3, &HAF
```

Now save the modified data to disk with the command `SAVEM "THEXDER", &H2000, &H5EFF, &H2000`.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

Sugar Software

☞ Calligrapher Combo Special - Save $14.95 ☜
Order either the OS9 or RSDOS CoCo Calligrapher Combo, which includes the Calligrapher and the two Economy Font Packages, and you will receive the small Font Set #7 **free**! A total of 59 fonts for only **$69.95**.! This special offer is available through September 30, 1988.

CALLIGRAPHER

CoCo Calligrapher - (Hybrid BASIC/ML) Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful invitations, flyers, certificates, labels and more. Includes 3 fonts: *Gay Nineties, Old English* and *Cartoon.* The letters are ½ inch high and variably spaced. Works with many printers including Epson, Gemini, Radio Shack, Okidata 92A, Banana and Prowriter. Additional fonts are available (see below). Tape/Disk; **$24.95**.

OS9 Calligrapher - (C) Although a different program from the CoCo Calligrapher, the OS9 Calligrapher prints all the same fonts. It reads a standard text file which contains text and formatting directives. You may specify the font to use, change fonts at any time, centering, left, right or full justification, line fill, margin, line width, page size, page break and indentation. Similar to *troff* on UNIX systems. Includes Gay Nineties, Old English and Cartoon fonts. Additional fonts are available (see below). Disk only; OS9 Level I or II; **$24.95**.

Calligrapher Fonts - Requires Calligrapher above. Each set on tape or disk; specify RSDOS or OS9 version; **$14.95** each. **Set #1** - (9 fonts) Reduced, reversed and reduced-reversed versions of Gay Nineties, Old English and Cartoon; **Set #2** - (8 fonts) Old Style and Broadway; **Set #3** - (8 fonts) Antique and Business; **Set #4** - (8 fonts) Wild West and Checkers; **Set #5** - (10 fonts) Stars, Hebrew and Victorian; **Set #6** - (8 fonts) Block and Computer; **Set #7** - (5 *small* fonts) Roman, Italics, Cubes, Digital and Old World.

Economy Font Packages on disk; specify RSDOS or OS9; **29.95**: **Font Package #1** - Above font sets 1, 2 and 3 (25 fonts) on one disk. **Font Package #2** - Above font sets 4, 5 and 6 (26 fonts) on one disk. Both Packages #1 and #2 (51 fonts) on one disk; **49.95**.

Calligrapher Combo Package - Includes the Calligrapher and both Economy Font Packages, 54 fonts in all; specify RSDOS or OS9; **$69.95**. *See special offer above.*

Sample Calligrapher Fonts

The CoCo Calligrapher!

INFORMATION MGT.

TIMS (The Information Management System) - (Hybrid BASIC/ML) Tape or disk, fast and simple general data base program. Create *files* of *records* that can be quickly sorted, searched, deleted and updated. Powerful printer formatting. Up to 8 *user* fields, sort on up to 3 fields. Tape/Disk; **$19.95**.

TIMS Mail - (Hybrid BASIC/ML) Tape or Disk based mailing list management program. Files are compatible with TIMS. Fast and simple to use. Supports labels 1, 2 or 3 across, 2½ to 4 inches wide. Tape/Disk; **$19.95**.

TIMS Utility - (Hybrid BASIC/ML) Utility companion for TIMS and TIMS Mail for multi-term search (*AND* and *OR* logic), global change and delete, split large files and more! Tape/Disk; **$14.95**.

TIMS Combo Package - All three of the above programs: TIMS, TIMS Mail and TIMS Utility on one disk - **$34.95**.

UTILITIES

OS9 Patcher - (C) Display and modify the contents of a file or memory module. Search for value or string. Calculates module CRCs; Disk only; OS9 Level I or II; **$19.95**.

Color Disk Manager - (100% ML) Disk utility with these features: Disk repair, selective track initialization, verify sectors, backups, tape to disk transfer, ROM Pak execution from disk, much more! Tape/Disk; CoCo 1, 2, 3 (except for 64K mode); **$24.95**.

EDUCATIONAL

Trig Attack - (100% ML) Ages 9 and up. In this educational arcade game, enemy *trigs* travel along math curves. Players learn important mathematical concepts as they play. Sound effects, colorful graphics. Excellent manual includes an introduction to trigonometry. Tape 16K CB/Disk 32K ECB; CoCo 1, 2, 3; **$19.95**.

The Educational Combo - The Combo includes these educational (and entertaining) games:
Silly Syntax (ages 5 and up) story creation game with 2 stories
Galactic Hangman (ages 7 and up) animated graphics, with a 700 word vocabulary
The Presidents of the USA (ages 10 and up) a presidential trivia game
The Great USA (ages 9 and up) a trivia game of the states
Trig Attack (ages 9 and up) Zap those *Trigs*
All five programs on one disk; **$49.95**.

SPECIAL INTEREST

Rental Property Income and Expense Management Package - Maintain your rental property income and expense records. Print output supported. 28 expense categories. *This program may be tax deductible.* Disk only; **$29.95**.

CoCo Knitter - Easy to use program to display or print instructions to knit a sweater: Cardigan or Pullover; Round or V-neck; Raglan or Set-in Sleeve; 3 weights or yarn; 8 sizes from baby to man. Tape/Disk; **$19.95**.

RAINBOW CERTIFICATION SEAL

MasterCard VISA

*TRS-80 is a trademark of Tandy Corp.

SUGAR SOFTWARE
P.O. Box 7446
Hollywood, Florida 33081
(305) 981-1241

All programs run on the CoCo 1, 2 and 3, 32K Extended Basic, unless otherwise noted. Add $1.50 per tape or disk for shipping and handling. Florida residents add 6% sales tax. COD orders add $5. Dealer inquiries invited. Orders generally shipped in 24-48 hours. No refunds or exchanges without prior authorization.

DOCTOR Q&A ASCII

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

I am looking for techniques or programs that allow BASIC *programs to be transferred from CoCo to IBM. I realize that most programs will have to be edited, but that is better than keying them in. Would saving the* BASIC *programs as ASCII files on the CoCo, then making the transfer by a null modem cable or the phone lines work?*

David Johnstone
Torrington, CT

℞ As you suggested, saving the programs in ASCII is the first step. Making the transfer with a null modem and a communications program on each would work (e.g., *Mikeyterm* on the CoCo, *ProComm* on the IBM). The commercial program *CoCoUtil* allows the IBM to read, write and format Color Disk BASIC files. Marty Goodman published programs to transfer files between IBM and CoCo disks in "The Great Transformation" in the June 1986 RAINBOW and "Transfer CoCo Files To MS-DOS Disks" in the July 1987 issue. Using D.P. Johnson's *SDisk3*, you can add Clearbrook Software's MS-DOS driver to OS-9 Level II. Using files from the OS-9 SIG on DELPHI — GREGL's `AR` and `IPATCH.AR`, and BRUCEISTED's `PCDOS.AR`, `RSDOS.AR` and `CC3DISK.AR` — you can enable OS-9 Level II to read and write disks in the IBM-PC and Disk Color BASIC formats.

A Bug in BASIC?

Happily pecking away at my computer the other day, I decided to enter a program from THE RAINBOW. *After typing it in, I tried to run it. The computer gave me an "FC Error in Line 15." That line contained* `PMODE4,1`. *I tried every combination of* `PMODE` *I could think of, always with the same results: "FC Error." I closed the computer and then reopened it; after that it accepted* `PMODE` *quite happily. What happened? I have a CoCo 3 and* BASIC *2.1, and I never had that problem before. Should I bundle up my CoCo and head to Radio Shack? Is it a bug in* BASIC?

Christiane Tom
Quebec, Canada

℞ On power-up the CoCo 3 copies all its ROMs into RAM — including BASIC. If you load and run a BASIC program that contains pokes and typographical errors, BASIC can be altered so that it malfunctions. Even after you fix your BASIC program, the CoCo's BASIC interpreter may still contain poked bugs that will remain in effect until you power down and reboot the machine. Since the problem has not recurred, this seems like a logical explanation.

Changing Characters

In the March '88 issue of THE RAINBOW, *Bill Barden had an article locating the CoCo 3's* `HPRINT` *character table in memory and telling how characters can be changed to your taste. Where is the table for the regular text screen characters, and can they be changed also?*

Tim Fultz
Bonneau, SC

℞ The "regular" text characters were in the SAM chip on the earlier CoCos and are in the GIME chip on the CoCo 3. In both cases, they are not in RAM and therefore cannot be altered with software.

Paint and Printer Don't Mix

I have Tandy's DeskMate 3 *Version 1.00 and am unable to print a picture I drew on the screen using* DeskMate*'s Paint feature. All I get is garbage. The other features of* DeskMate *print out without any problems and with no modifications to the program or printer. I have a 128K CoCo 3, Multi-Pak Interface (modified by Radio Shack), Tandy CM-8 color monitor, Tandy FD 501 disk drive and a Star NX-10 dot matrix printer.*

George Masek
Maryville, TN

℞ With the exception of *DeskMate 3*'s Paint feature, the other features perform only ASCII text printing, which is pretty much a standard across all printer lines. The Paint feature, on the other hand, was written by Tandy to use the 7-dot graphics drivers built into its own LP and later DMP printer lines. The Star printer you have uses IBM's 8-dot graphics and is incompatible with Tandy's graphics driver.

Memory Locations and Dual Speed

The 128K CoCo 3 has memory locations `&H70000` *to* `&H7FFFF`. *Why, then, is it possible to access memory locations below* `&H70000`? *For instance, with the high speed poke I discovered another location by poking values into locations* `&H400` *through* `&H5FF`, *which caused characters to appear on the Lo-Res text screen, although the Lo-Res text screen memory location is* `&H70400` *through* `&H705FF`.

Also, when OS-9 Level II is initialized on the CoCo 3, at what speed is the CoCo 3 running, 0.894 or 1.788 MHz? How do you switch speeds in OS-9 Level II? Radio Shack's catalog says OS-9 Level II supports dual speed on the CoCo 3, so both speeds should be available.

Bruce Arsenault
Nova Scotia, Canada

℞ On the CoCos 1 and 2, the address space was 64K ranging from `$0000` to `$FFFF`. Direct access to mem-

---

Richard Esposito is the principal engineer for BDM Corporation. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

ory addresses was accomplished in BASIC with peeks and pokes. To maintain compatibility with programs written for earlier machines, peeks and pokes on the CoCo 3 access the 64K addresses `$70000` to `$7FFFF` "normally accessible" to BASIC by using CoCo 3 extended addressing terminology. If you prefer using extended addresses, the CoCo 3 has the additional functions `LPEEK` and `LPOKE`. To give an example, `POKE&H0500` is the same thing as `LPOKE&H70500`.

OS-9 Level II normally operates at 1.788 MHz. You can switch speeds by writing to the GIME registers at `$FFFD8` (slow) and `$FFFD9` (fast).

Logon Problems

I am having problems logging on to Delphi — or any other BBS system, for that matter. I am working with a CoCo 2 64K ECB disk and tape. I recently ordered Autoterm 3.2T, *which is no help either. I have the Deluxe RS-232 Program Pak, and I'm using the TRS-80 Modem IB (Part Number 1175). My problem is that every time I connect, everything from the host computer comes back to my screen so garbled I can't understand it. I recently had a new telephone line put in my den just for computer communications, and I got the "no-frills" service: no call waiting, rotary line service, etc. Could that be the problem? Would logging on work better with digital service?*

Cardell Stevenson
Philadelphia, PA

℞ Unless the quality on rotary dial lines in Philadelphia is much worse than elsewhere, I don't think that's the problem; I use rotary dial lines at 2400 baud with no problem. Your problems are more likely the wrong baud rate, type of parity or number of stop bits set with your communication software or hardware.

Colorless CoCo 3?

Now that I have a CoCo 3 with an RGB monitor, many of the programs I keyed in from THE RAINBOW *on my old CoCo 2 with a color TV screen no longer give a color display, appearing instead in black and white. A friend told me that this is because the RGB monitor does not show the artifact colors you get with the color TV. Is this the case, and is there any kind of a routine I can key in on the CoCo 3 that will let me run these old programs and get the colors I got with the CoCo 2 and the color TV?*

Also, I would like to try out the BBS program I keyed in from the November 1987 issue of THE RAINBOW, *making the CoCo 3 the answering terminal and the CoCo 2 the originating terminal so that I can observe the operation of the BBS program on both screens. Do I just connect the serial port of one CoCo to the serial port of the other, (i.e., disconnect the modem)? The March 1987 "CoCo Consultations" column gave some rather cryptic instructions for making a null modem cable. It is my understanding that you need two 4-pin DIN connectors and a length of 3-wire cable. Pin 3 of Plug 1 is then connected to Pin 3 of Plug 2; Pin 2 of Plug 1 is connected to Pin 4 of Plug 2; and Pin 4 of Plug 1 is connected to Pin 2 of Plug 2. Can you please confirm that this is the correct procedure?*

Please note that I do not have a Radio Shack RGB monitor. I have a Magnavox Model 8CM515, which can be used in RGB or composite mode. I've been using it in RGB mode.

Charles Roman
Skokie, IL

℞ With your Magnavox 8CM515 you also need to make the composite video connection, using a cable with phono jacks at both ends. Then when you want to view artifacting colors, push the CVBS button under the flip panel on the front of your monitor.

Your description of the null modem cable is fine.

An Address and an 80-track Drive

Do you know the address for Mikeyterm *so I can get it on OS-9?*

Also, what kinds of 80-track 5¼-inch drives are available?

Allen Martin
Holbrook, MA

℞ *Mikeyterm* author Mike Ward's address is 1807 Cortez, Coral Gables, FL 33134. Incidentally, *Mikeyterm* runs only under Disk BASIC. It is not designed to work with OS-9.

The only 80-track drive I would consider is the TEAC 55F. The older ones have a jumper marked DS that can be set for 40- or 80-track operation. I prefer to replace the DS jumper with a DPST switch, giving me hardware selection of 40- or 80-track operation. The newer TEAC can be similarly configured by adding a resistor (10 ohm) in line with an SPST switch to the solder pads marked "R15." I recently found out there is yet a newer version of these drives with two large square ICs. (The older drives had only one.) The newer drives require a 100 ohm resistor with a switch connected to the solder pads marked "R19."

Replacement Generator

I've been told that the 6847-T1 VDG mentioned in your January 1988 column has been discontinued. Is this true? If not, where can I purchase one, and how much can I expect to pay? If it is true, can another type be substituted?

T. Anthony Ertl
Colbert, WA

℞ Although it is no longer manufactured or readily available, I believe you can still order one as a replacement part for a Korean CoCo 2. The price is approximately $15 from Radio Shack National Parts.

Shifted Display

I am using my new Magnavox 8CM515 monitor with Greg-E-Term *to write this letter. I am using a CoCo 3 in 80-column mode; for some reason my display is shifted all the way to the left so that the characters on the extreme left are barely legible, yet there is almost three-quarters of an inch available on the right. Why is that? Is there an adjustment I can make to correct this situation?*

Dennis Wood
Indianapolis, IN

℞ Adjust the "horizontal centering" at the left rear of your monitor.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

Communicating computer-to-computer

All About Serial Packs

By Tony DiStefano
Rainbow Contributing Editor

Communication is important in today's world. We understand what other people are saying because we all know the rules of communication. This set of rules is a sort of English protocol. When we hear the word "apple" (perhaps a bad example!) we immediately think of a red, ball-like object that can be eaten. If you say the word to anyone who knows the English protocol, he or she too will think of a red, ball-like object that can be eaten. This is a form of communication.

A set of rules has to be followed in communicating with a computer, too. This time you cannot use the English protocol, because the computer does not understand that — yet! To communicate with most computers, you have to press a number of switches arranged in a way that is familiar in human communications: the keyboard. We press these switches in an order that makes sense to us, but to the computer this is just a sequence of pressed switches. It compares this sequence to a known sequence in its memory banks. If a match is found, the computer then proceeds according to its programming.

The keyboard is an interface between a person and a computer, but there are times when we want one computer to communicate with another computer in order to transfer some kind of information the user needs or is sending. This computer-to-computer communication also has to follow a certain protocol.

There are many of these, ranging from simple serial communications to high-speed networks to parallel mainframe workstations. The protocol most used in the CoCo is serial. In this case, serial means to transfer data one bit at a time. The CoCo's internal memory is organized in eight-bit chunks called bytes. To transfer one byte of data from one computer to the other serially requires eight bit transfers. But that is just the data. In order to keep errors at a minimum, a start bit and a parity bit must also be included.

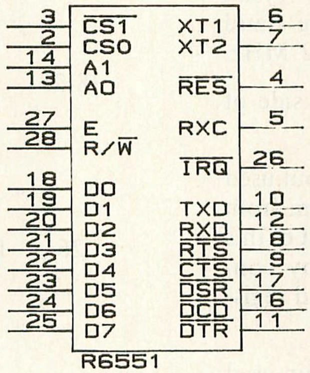


Figure 1

The CoCo has no special hardware to communicate in a serial fashion. Instead, it has a few bits on a PIA that is used by the CPU to simulate a real serial port. This makeshift port is limited in speed and performance. Also, with the exception of the CoCo 3, there doesn't seem to be any good software that supports this "bit banger," especially if you want to communicate at 1200 baud. The CPU simply does not have enough time to take care of the serial I/O and still do the rest of its chores. This led Tandy to introduce the Deluxe RS-232 Pak.

Inside it lies the hardware for a real serial port and true RS-232 protocol. At its heart is the Rockwell R6551 ACIA (Asynchronous Communication Interface Adapter) chip. This chip has all the necessary circuitry to interface the parallel data of the CoCo's CPU to the standard RS-232 serial protocol and is capable of baud rates of 50 to 19,200. (Baud rate is the speed at which the bits are transferred.) It is also capable of word lengths from five to nine and has a programmable number of stop bits and parity detection. In fact, it is a great chip for our use. Figure 1 shows the pinout of the R6551; a pin-by-pin description of this 28-pin chip appears in Figure 3 on the next page.

RS1	RS0	WRITE	READ
0	0	Xmit Data Register	Rmit Data Register
0	1	Reset	Status Register
1	0	Command Register	
1	1	Control Register	

Figure 2

From Figure 2, we see that the R6551 has four registers. The first is the data register. This is data going to and from the different computers. The next register is the Control Register. Bits 0 through 3 control the baud rate of the ACIA. Here is a list of the baud rates:

Bits 3 2 1 0	Baud Rate Generated
0 0 0 0	EXTERNAL
0 0 0 1	50
0 0 1 0	75
0 0 1 1	109.92
0 1 0 0	134.58
0 1 0 1	150
0 1 1 0	300
0 1 1 1	600
1 0 0 0	1200
1 0 0 1	1800
1 0 1 0	2400
1 1 0 0	3600
1 1 0 1	4800
1 1 1 0	9600
1 1 1 1	19200

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

Bit 4 controls the external clock, with 1 being baud rate and 0 being external. Bits 5 and 6 are word length. 00 is 8, 01 is 7, 10 is 6 and 11 is 5. Bit 7 high is two stop bits, and Bit 7 low is one stop bit.

The next register, the command register, is used to control the specific transmit and receive functions shown in Figure 4.

Pin No.	Name	Description
1	GND	Signal and power ground. All signals are referenced to this pin.
2	CS0	Active low-input chip selects the device. When this pin is low and CS1 is high, the chip is selected.
3	CS1	Active high-input chip selects the device.
4	RES	Active low input resets and initializes internal registers to zero.
5	RSC	Receive clock pin is bi-directional; serves as the receiver of 16X clock input or output.
6	Xtal1	This pin and Xtal2 are normally directly connected to an external crystal to derive various baud rates. Crystal frequency for these baud rates must be 1.8432 MHz.
7	Xtal2	Connected to other side of the crystal.
8	RTS	Request to send output used to control the modem from the processor. Output of this pin is determined by contents of the command register.
9	CTS	Clear to send input pin used to control transmitter operation. Transmitter section of the chip is automatically disabled if CTS is high.
10	TXD	Transmit data output pin used to transfer serial data to the external device. The least significant bit is transmitted first, with rate determined by baud rate selected.
11	DTR	Data terminal ready outpin pin used to indicate status of the chip. A low on DTR indicates the chip is enabled. This bit is controlled via Bit 0 in the command register.
12	RXD	Receive data input pin used to transfer data from the external device.
13	RS0	First of two register select lines connected to CPU address lines. Used to select various internal registers. See Figure 2.
14	RS1	Second of two register select lines. See Figure 2.
15	Vcc	Input is connected to +5 volts. It powers the chip's internal circuits.
16	DCD	Data carrier detect input pin used to indicate to the chip the status of carrier detect output of the external device.
17	DSR	Data set ready input pin used to indicate readiness state of the external device. A low indicates a "ready."
18-25		Data bits D0 through D7, respectively; bi-directional lines used to transfer data to and from the CPU to the chip.
26	IRQ	Interrupt request pin is an open collector (drain) output used to flag the CPU when the chip has finished using data. IRQ status bit allows many pins to be connected to the same IRQ line to the CPU.
27	E	E clock input to this pin used to gate all data transfers to and from the CPU.
28	R/W	Read/write input pin used to control direction of data transfers between the CPU and the chip. A low on the R/W pin allows a write to the chip.

Figure 3

Bits	Description		
0	Hi= Enabled DTR		
-	Lo= Disabled DTR		
1	Hi= IRQ Disabled		
-	Lo= IRQ Enabled		
3 2	Xmit IRQ	RTS	Other
- -			
0 0	Disabled	Hi	-
0 1	Enabled	Lo	-
1 0	Disabled	Lo	-
1 1	Disabled	Lo	Xmit BRK
4	Hi= Echo		
-	Lo= Normal		
7 6 5	Operation		
- - -			
X X 0	Parity Disabled		
0 0 1	Odd Parity		
0 1 1	Even Parity		
1 0 1	Mark Parity Xmit Check Disabled.		
1 1 1	Space Parity Xmit Check Disabled.		

Figure 4

The final register is the status register. These bits in the status register indicate to the processor the status of the various R6551 functions as outlined in Figure 5.

Bit	Low	Hi
0	No parity error	Parity error detected
1	No framing error	Framing error detected
2	No Overrun error	Overrun error detected
3	Receive buffer -Not full	Receive buffer -full
4	Transmit buffer -Not empty	Transmit buffer -empty
5	DCD detect	DCD not detected
6	DSR ready	DSR not ready
7	No IRQ	IRQ has occurred

Figure 5

The R6551 is the heart of the pack, but not the only part. Its job is to take the eight-bit data to and from the CPU and transmit it at the right baud rate and parity, but that is not all. This chip has a high level of 5 volts and a low level of ground, or 0, volts. RS-232 standards require that the voltage for serial communications be a high of +12 volts and a low of -12 volts. This is done through two chips known as level shifters. The first, the MC1488, is a shifter that changes 5/0 volt levels to 12/-12 volt levels. The other, the MC1489, does the opposite: It shifts the 12/-12 volt inputs to 5/0 volt.

Other parts include decoders and buffers, resisters and capacitors. Software in a ROM is also included. This software gives the CoCo the ability to communicate with other computers. It is OK as far as "dumb terminals" go, but it lacks the power for good data transfers. Most people use other third-party software to drive this pack.

I have designed an equivalent to the above-described RS-232. It functions the same except that it has no built-in software — no great loss, since most people do not use it. If you are using OS-9, the software driver is already included and is compatible with my pack. For prices and delivery, call CRC at (514) 383-5293.

Hint . . .

Cobble the Step Rate

You can use the `Cobbler` command to tailor what you get in memory when the system disk boots. For instance, if you want a faster step rate as a permanent feature, first make sure that both *Modpatch* and *Cobbler* are on your disk in the commands directory. Then use the `Edit` or `Build` command to create this short program called *Steprate*, which is to be stored in the root directory:

```
L d0
c 14 00 02
V
```

(See Dale Puckett's column in the May '87 issue of THE RAINBOW, Page 201, for various step rate values.)

Play it safe and make a backup copy of the whole disk once you have the step rate file in place. (Caution: A fragmented boot file cannot be cobbled, yet it might not reveal itself until you start the `Cobbler` action. This destroys the disk contents.) Use the backup copy to cobble things into memory. At the OS-9 prompt, call the step rate action by entering `modpatch steprate`. Then with the faster rate in place (you will hear your disk action change), cobble the change into permanency at the OS-9 prompt by entering `cobbler /d0`. You can now delete the step rate file, and know that next time you boot OS-9 it will come online with the change in place.

Del Turner
Kamloops, BC

THE POWER STONES OF ARD

THE QUEST FOR THE SPIRIT STONE

You're tired, you're hungry, not to mention you're badly injured. No one in town seems to want to talk to you. Your magic sword has stopped glowing, the room is dark, you're out of spells, you can't get your wand to work, you won't swear to it but you may be lost, you have no idea what that last puzzle meant, and you hear something large moving just beyond the only door. The old sage warned you there would be days like this!

"QUEST FOR THE SPIRIT STONE" is an Adventure that will keep you playing for hours. It features single keystroke commands, 16 color graphics, 100% Hi-Res graphics screens, full game save, extensive playing area, level advancement, and the disk is not copy-protected. You choose your character's name, race, sex, and ability scores. The use of arrow keys simplify movement. This one is easy to play but a challenge to complete!

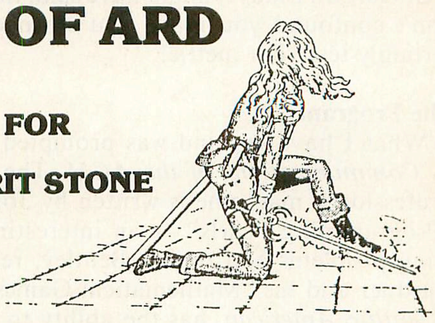
ONLY $18.00 AND WE PAY SHIPPING!

North Carolina residents add 5% sales tax

COLOR COMPUTER 3 AND ONE DISK DRIVE REQUIRED

Send check or money order to:
or call:
(919) 582-5121

THREE C's PROJECTS
P.O. Box 1323
Hamlet, NC 28345



Barden's Buffer

CoCo 3

Can You Survive This Column?

By William Barden, Jr.
Rainbow Contributing Editor

What three terms thrust most fear and loathing into the hearts of CoCo aficionados? No, the answer is *not* "MS-DOS, IBM and OS-9!" I was thinking more along the lines of assembly language, interrupts and BASIC "internals."

If you can bear with me through this column, I'll reveal some of the secrets of these topics. In addition, I'll show you an elegant program that I haven't seen before (although it's undoubtedly been done by someone). As you might guess, the program gets into all three areas. As Nietzsche (or was it G. Gordon Liddy?) might have said, those CoCo topics that don't confound you make you stronger. This column will certainly test your mettle!

The Program

What I have in mind was prompted by a column I read in *Communications of the ACM*. The shining light in this professional magazine is written by Jon Bentley and called "Programming Pearls" — an interesting look at programming problems and topics. Bentley, reminiscent of Martin Gardner and his "Mathematical Games" column in the old *Scientific American*, has the ability to make things simple. In one of his columns Bentley mentions a program that times the component parts of a program so that the user can see how efficient his code is. Although a simple example is given, it got me to thinking: It should be possible to *display* an entire program graphically, with the speed of various parts indicated on the graph. A sample is shown in Figure 1.

How can this be done? One way might be to incorporate a timing routine in each subroutine of the program. The subroutine might be called at entry and exit to record the elapsed time from the CoCo `TIMER` function. This is kind of messy, though, and doesn't allow you to get any finer resolution than a subroutine, which may consist of many lines.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

A better idea would be to time each BASIC statement or line. A BASIC statement takes a certain amount of time to execute, of course — on the order of milliseconds (thousandths of a second). The following program takes about 2.5 seconds to execute on a CoCo 3 in slow speed, making each of the 1,000 times through the loop about 2.5 milliseconds.

```
100 FOR I = 1 TO 1000
110 NEXT I
```

How this time is divided between Line 100 and Line 110, though, is anyone's guess. Longer lines and those involving mixed number calculations, division and exponentiation may be dozens of times slower.

One way to time the execution of a BASIC line would be

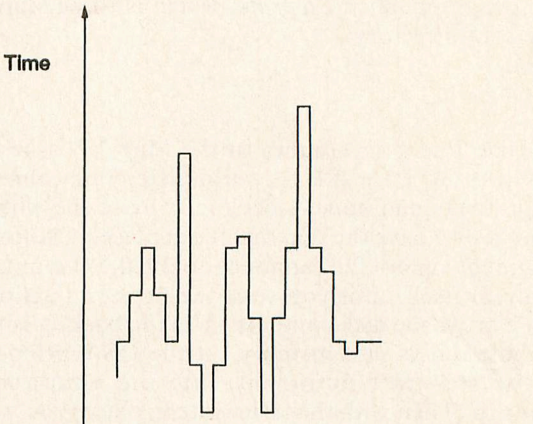


Figure 1: Graphic Display of a Program's Speed

to record the time at the beginning and end of the line. To do that, though, we'd need some hooks in the "internals" of the BASIC interpreter. Another approach is to periodically sample the execution of a program. If the program could be tested every few milliseconds, we could examine which line was executing and tally a mark for that line, as shown in Figure 2. At the end of the program execution, we'd have a tally of the times that each line had executed. Some lines might be missed, but in the long run we'd have a pretty good idea of which program lines took the longest.

It probably won't surprise you to learn that there is a way to perform this sampling. The CoCo has a real-time clock interrupt that occurs 60 times per second. One-sixtieth of a second is about 16.7 milliseconds, which is not fine enough to catch all lines, but over many iterations of a program should represent the relative elapsed times of each line.

What's an (*Oops, There's the Doorbell!*) Interrupt?

An interrupt is a temporary suspense of the program's operation in order to perform some other important task. The important task is another program, but usually a short one. Once this task is performed, the interrupted task is picked up once again from the interruption point. Interrupts can be catastrophic or non-catastrophic.

Older computers with non-volatile core memory, which retained data even after power was turned off, had a "power fail" interrupt. In the space of a few milliseconds before the power disappeared completely, the status of the machine would be saved in core memory. When power was again restored, the program picked up again from the interrupted point. You could literally yank the power cord, wait a minute and plug it in again — the computer would continue typing a listing as if there had been no interruption!

A non-catastrophic interrupt is one that is more or less expected. Pressing a key on the keyboard generates an interrupt for some computers. If the computer is displaying data on the screen, the display might be interrupted for a few milliseconds while the keyboard character is read into a buffer. The user probably isn't even aware that the interrupt has occurred.

There are a number of different interrupts in the CoCo. The 60-Hertz (60 times per second) interrupt, though, is handled through the IRQ interrupt, which is usually the main interrupt in a microprocessor such as the 6809.

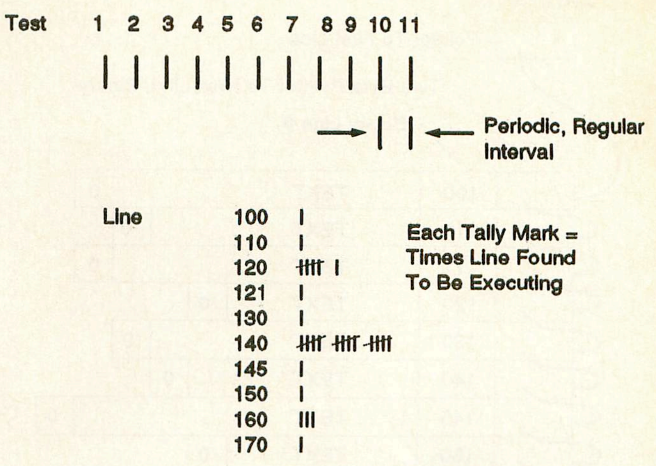


Figure 2: Testing and Tallying a Program

The IRQ interrupt is used mainly to increment a counter for the `TIMER` function. If you look up the `TIMER` function in the BASIC manual, you'll see that it returns a count of the elapsed time in one-sixtieth-second increments.

When an IRQ occurs, the 6809 microprocessor automatically transfers control to an interrupt subroutine in BASIC ROM. This interrupt subroutine contains a few dozen machine language instructions to increment the counter for the `TIMER`.

If we could sneak in a few lines of our own code, we could examine BASIC to see which line was executing, make a tally, and then let BASIC continue with the `TIMER` update function. Sounds easy enough. . . .

Which Line is Executing?

However, that's another problem. How do we know which line is being executed?

Introducing the FOCUS™ software system for OS-9™ Level II—serious business for your CoCo3!

FOCUS Applications Hub

A multi-tasking /multi user systems of I/O functions and utilities which features:

- Two level menu system with company code and access code protection.
- Unique filing, sorting, searching and record locking routines.
- Works with most printers, floppy/hard drives and terminals.
- Similar keys and screen formats for all FOCUS-MATE programs.
- Routines for file maintenance, data backup and setup.
- Context-sensitive help screens.

FOCUS-MATE Correspondence Module

An integrated Text Editor, Text Formatter and Mailing List Database:

- Import text or database files for mail merge facilities.
- Control all printer functions, change formats anywhere in text, save formats.
- Preview final text on screen.
- Print with left, right, full or centered justification, tabs, auto headers/footers, page numbering and dictionary lookup.
- Multiple text column capability.

FOCUS-MATE General Ledger Module

A sophisticated General Ledger package for small business.

- All features integrate with other FOCUS-MATE modules.
- Number of accounts and transactions limited only by disk space.
- Auto balance checking, flexible period and year-end procedures, profit/cost center consolidated ledger and batching capabilities.
- Reports: Balance Sheet, Trial Balance, P&L Statement, Transaction Journal, Transaction Aging.

OS-9 Programmers:FOCUS is a great tool-box for system developers!
with purchase of OS-9 Level II and FOCUS, boot file is free, multi-task on 128K! OS-9 Level II $64.95

	Reg.	*Now*
FOCUS	$65.95	$55.95
Correspondence Module	49.95	39.95
General Ledger Module	49.95	39.95
FOCUS Technical Manual	19.95	15.95

Min. Sys. Req.: CoCo3, OS-9 Level II, 360K disk drive, 80 col. display

Easy Street™
Data Systems

4500 19th St. #530
Boulder, CO 80302
(303) 440-4767

Upgrading your CoCo System? Ask us about Peripherals!
Special: Bare 1/2ht. Floppy Drives, 360K $89.95, 720K (31/2') $119.95.

Add $3.00 for shipping/handling
TERMS: COD, Money Order, Cashiers checks, Allow 2 weeks for personal check to clear. Sorry no MC/VISA
Hours: 10:00 to 6:00 MST, Tues.-Sat.

OS-9 is a trademark of Microware and Motorola Inc.

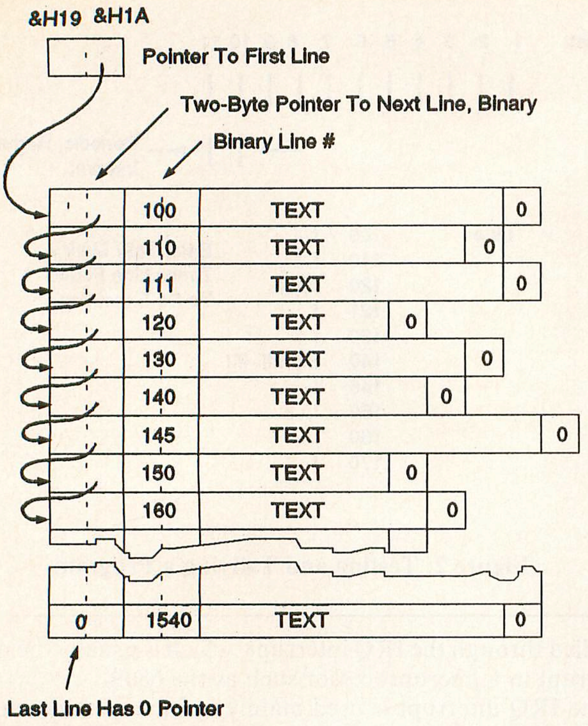


Figure 3: CoCo BASIC Program Line Format

Think about a BASIC interpreter. Obviously it has to record the current number of the line being executed, in addition to other things such as the current position of the BASIC statement in the line, the link to the next line, and so forth.

How do you go about finding out how BASIC operates? The best way is to get a disassembly of BASIC. CoCo BASIC is written in assembly language, a low-level language that the 6809 microprocessor understands. Microsoft, as secretive as the next billion-dollar company, doesn't freely distribute copies of the assembly language code for any system's BASIC. However, various people have disassembled the Microsoft code and published disassemblies with comments. By looking at these listings, you can see what is going on in BASIC. I've even been known to disassemble parts of BASIC myself, using the disassembly capability of *EDTASM+*, the CoCo editor/assembler/debugger. (However, I haven't published any disassemblies, so please don't ask me for one — I use the superlative Spectral Associates publications.)

In looking at the BASIC disassembly, it's easy to see that the start of the BASIC program is stored in locations &H19 and &H1A — the &H prefix indicates a hexadecimal constant. Addresses in the CoCo are stored in two bytes, with the first byte being the most significant and the second, the least. Together they make up a 16-bit number representing a memory address of 0 through 65535. (CoCo 3's extended memory still uses this scheme for the 64K memory space of BASIC.)

BASIC program lines have the rigid format shown in Figure 3. They are stored contiguously in memory, one following the other. They may be from six to 254 bytes long, depending upon what's in them. The first two bytes of each line, however, are the memory address, in binary, of the next BASIC program line. The next two bytes are the memory address, also in binary, of the line number. The text of the line follows, with the end of the line marked with a zero byte. BASIC text is "tokenized" — converted to one- or two-byte codes instead of ASCII characters — for efficiency in storage. The last line of the BASIC program has a zero value for the memory pointer.

The program shown in Listing 1 starts at the beginning of the BASIC program and follows the lines through to the end. The line number is displayed for each line, and the program stops when the last line is reached. As you can see, there's nothing too magical about this process. The two bytes of the memory pointer and line number are converted to a 16-bit unsigned integer (values from 0 through 65535) by multiplying the first byte by 256 and adding the second byte, as shown in Figure 4.

Recording the Lines

If we're to examine the program 60 times per second and tally which line is being executed, we'll need a table of line numbers and a place to put the count. Each 60 counts represents one second's worth of time. Since we might be waiting several seconds in some lines (for example, INPUT lines that are waiting on user input data), we'll need at least two bytes to hold a count value. One byte for a count value can hold only 255 counts, but two bytes can hold 65,535 counts, representing 1,092 seconds.

We want to hold these counts in memory, since writing to disk would be too slow. But where in memory? One option is to reserve an area of memory using the CLEAR statement. The CLEAR statement in the CoCo reserves a stack area (for BASIC's internal calls) and a protected memory area. The format of CLEAR is 100 CLEAR 800, &H6FAE.

Here every location from &H6FAF onward has been protected from use by BASIC — it's like setting aside a reserved area to do anything we want with. CoCo BASIC RAM memory extends from &H0000 (decimal 0) to &H7FFF (32,767 decimal). We also set aside 800 bytes above for the stack; this is just an arbitrary figure. In case you're wondering about the odd figure, &H6FAE, it'll be explained shortly.

&H7000 is a nice round figure at which to start a table. The table must hold every line number and a 16-bit count. Since line numbers are also 16 bits, we'll need four bytes for each entry, as shown in Figure 5. The area from &H7000 to &H7FFF is 4,096 bytes long, large enough to hold 4,096/4 = 1,024 entries. We'll actually hold 640 entries, however, due to

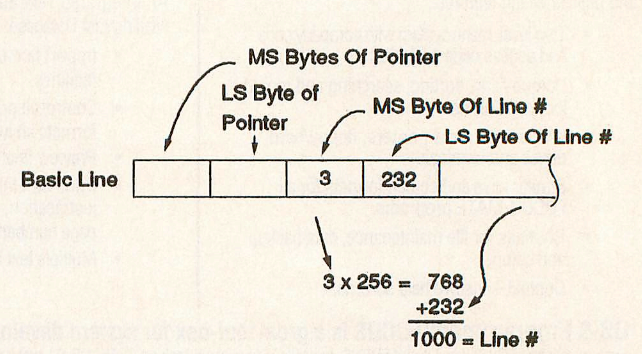


Figure 4: Conversion of Line Number and Pointer to 16-Bit Integer Values

display limitations. Still, 640 BASIC lines is a long program.

The program shown in Listing 2 scans the BASIC program in memory and lists all line numbers less than 10000. For each line number, an entry is made in the table at `&H7000`: two bytes of the line number and two bytes of the count, which is initialized to zero (there's garbage in the count if it is not cleared). The last line number of the table is marked as Line Number 0, a nonexistent line number.

The BASIC program to do this starts with Line Number 10000. We don't want to record the execution times of this program, but rather the execution time of another program to be tested; for this reason the *Time Analyzer* lines are ignored.

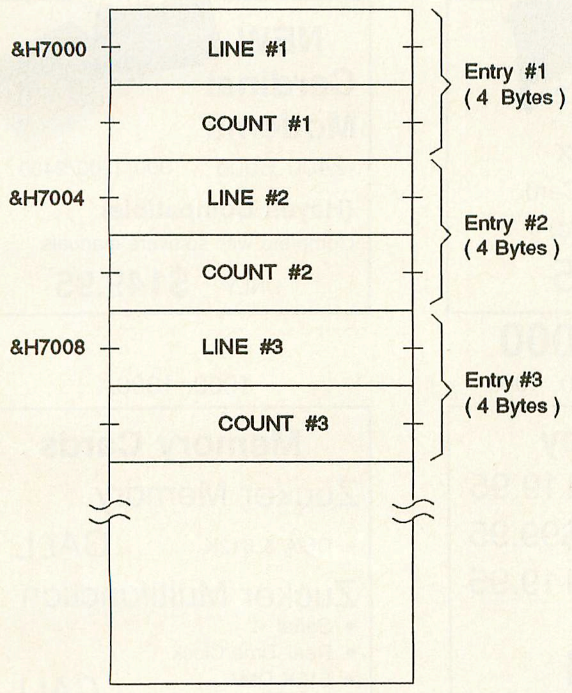


Figure 5: &H700 Table Format

The Program Display

Let's move ahead a little bit and see what kind of display we need. Assume that we have initialized the table, and the counts have been magically made during execution of the program we're testing. The next step is display the data in some coherent form. One way is shown in Figure 6.

Figure 6 uses the 640-by-192 mode of the CoCo 3 to display line numbers. Since there may be hundreds of them, they are displayed by position. Each dot position represents another line number; and the display goes from left to right, equivalent to BASIC program lines from beginning to end. The number of counts (one-sixtieth second) is displayed as a vertical line. The higher the line, the more times an interrupt occurred while that line was being executed and the more time that line takes.

However, we also want to be able to read out the actual count for each line. We've accomplished that by moving a "line cursor" along the X axis. As the line cursor is moved,

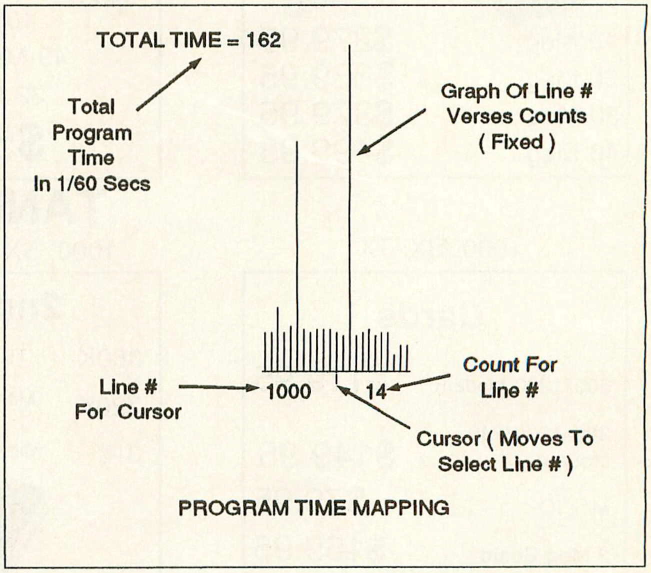


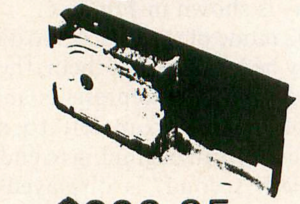
Figure 6: Displaying the Data

DMC "No Halt" Disk Controller $137.50*
*without ROM
NEW
Unleash your CoCo's potential!
Our new Dual Mode Controller (DMC) implements a new "no halt" mode of operation so it can read from or write to disk all by itself. The 6809 is freed to process other tasks and respond to interrupts. This is how OS-9 was meant to run! But the Radio Shack "halt" mode of operation is also retained to maintain full compatibility with existing non-OS-9 software.
New! OF-Link (FLEX under OS-9)
Lets you run FLEX in a window under OS-9 Level II. Ask for more details. Introductory price $49
Other DMC features:
- works with original CoCo, CoCo2, or CoCo3 (Multi-Pak usually required)
- no adjustments — all digital data separator and write precompensation
- gold plated card-edge connectors for reliability
- ROM socket takes 24 pin or 28 pin chip; dual DOS capability
- Radio Shack DOS 1.1 ROM for complete compatibility
- 8K bytes cache memory on board (32K optional)
- D.P. Johnson's SDISK package (specially modified for DMC) is included at no charge ($30 value)
- disk caching software included free
- fully assembled and tested; 120 day limited warranty
- call or write for free brochure for more details
To order: DMC controller with RSDOS 1.1 and SDISK (specify OS-9 Level I or II) $149.50 plus $5 S/H ($12 overseas). Add $16 for 32K RAM option. Terms (prices in $US); check, money order, VISA. U.S.A. orders shipped via UPS from WA state.
Did you know?
...that all the older floppy disk controllers for the CoCo completely tie up (and even halt) the 6809 processor during disk reads and writes? No wonder your keyboard is constantly "losing" characters! Or that your serial port often gives you garbage.
SARDIS TECHNOLOGIES
2261 East 11th Ave., Vancouver, B.C., Canada V5N 1Z7
(Also ask about our ST-2900 6809 based expandable single board computer)
(604) 255-4485 (Pacific Time)

TANDY ADD-ONS

For Tandy 1000, SX, TX

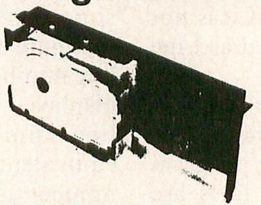
10 Meg Hard Card



$299.95

1000, SX, TX

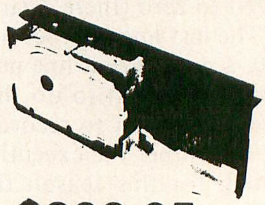
20 Meg Hard Card



$349.95

1000, SX, TX

30 Meg Hard Card



$399.95

1000, SX, TX

Hard Drive Kits

10 Meg	$279.95
20 Meg	$339.95
30 Meg	$379.95
40 Meg	$499.95

NEW **TANDY**

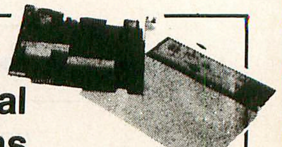
1000, SX, TX

49 Meg Hard Card

32 MS (speed)

$599.95

Rodime



NEW Cardinal Modems

2400 Baud 300/1200/2400

(Hayes Compatible)

Complete with software manuals

ONLY **$149.95**

TANDY 1000

1000, SX, TX

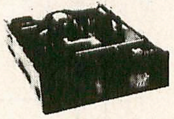
Cards

300/1200 Modem	$119.95
300/1200/2400 Modem	$149.95
Mini IO	$79.95
2 Meg Board	$169.95

1000, SX, TX, 3000, 4000

2nd Floppy

360K	TEAC	$119.95
720K	Mitsubishi	$99.95
3½"	Mitsubishi	$119.95



1000, 1000A

Memory Cards

Zucker Memory

- DMA & 512K CALL

Zucker Multifunction

- Serial
- Real Time Clock
- 512K DMA
- Software

CALL

Tandy 3000 & 3000HL

Hard Drive Kits

Includes Drive, Controller & Cable

20 Meg	$399.95
30 Meg	$599.95
40 Meg	$699.95
80 Meg	$999.95

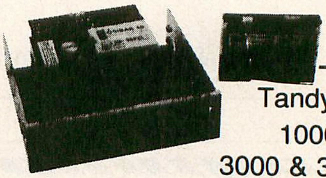
Tandy Model 3, 4, 4P

Hard Drive Systems

External

Complete - ready to run

10 Meg	$499.95
20 Meg	$699.95



Tandy 1000,
1000SX,
3000 & 3000HL

Tape Backup

20, 30, 40 Meg Tape Backup	$399.95
60 Meg Tape Backup Archive	$659.95

TRUE DATA PRODUCTS
115 So Main Street
Uxbridge, MA 01569
Tel. 617-278-6555
1-800-635-0300
Hours: 9 a.m.-6 p.m., Sat. 10 a.m.-4 p.m.

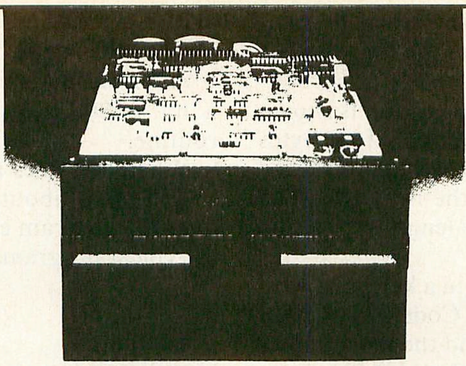
NEW

DISK DRIVES

Starting at

89^{95}

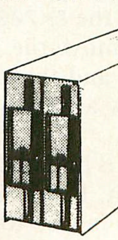
with case &
Power Supply
129.95



TANDON MPI TEAC

Speed 6ms tk to tk and up
Capacity 250k unformatted
Tracks 40
Warranty *now 1 Year*

New Low Price!



40 or 80 Tracks
½ Hght. Teac/Panasonic

1 YEAR Warranty!

SATISFACTION GUARANTEED!!

ALL DRIVES FULLY TESTED AND WARRANTEED

We carry only the finest quality disk drives
no seconds • no surplus

Free Software for Drive 0 Systems

CoCo Checker...Test roms, rams, disk drives and & controller printer, keyboard cassette & more.
Tape/Disk Utility...Transfers disk to tape and tape to disk.

169^{95} Drive 0

- Full Ht Drive
- Single Case
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & manuals

189^{95} Drive 0

- Double Sided Slim Line Drive
- Case holds 2 slim line drives
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & Manuals

289^{95} Drive 0 & 1

- 2 Double Sided Slim Line Drive
- Case holds 2 slim line drives
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & Manuals

Other Drive Specials

Drives cleaned, aligned & tested, **29^{95}**

119^{95}
2nd Drive
for new Radio Shack
includes:

- Slim Line DS/DD Drive
- Cabling & Instructions
- Mounting Hardware

Full Ht Drive	**89^{95}**
Full Ht Drive Ps/Case	**129^{95}**
Slim Line Drive	**99^{95}**
Slim Line Drive Ps/Case	**139^{95}**
2 Slim Drives Ps/Case	**239^{95}**
Disk Controller	**59^{95}**

Single Ps & Case	**44^{95}**
Dual ½ht Ps & Case	**54^{95}**
Dual Full Ht. Ps & Case	**79^{95}**
Disk Controller	**59^{95}**
10 Diskettes with free library case	**9^{95}**

Dealer Inquiries Invited

617-278-6555

We welcome
- Visa/Mastercard
- Checks (allow 2 weeks for clearing)
- C.O.D. Add $2.

TRUE DATA PRODUCTS

9 South Main Street
Uxbridge, MA 01569
617-278-6555
Hours: Mon.-Sat., 9-6 (EST)

***Call us today!* 617-278-6555**
Order Toll Free 1-800-635-0300

the line number is displayed, along with the count for that line number. This gives us a way to read out the line number for interesting lines.

The program to display the table after execution is shown in Listing 3. It scans the `&H7000` table by moving four bytes at a time. For each move the line number is read from the first two table bytes and the count from the next two. The count is used to draw a vertical line whose length represents the size of the count.

Cursor movement is handled by reading in a key press with an `INKEY$` statement. If the right arrow (Code 9) has been pressed, the cursor is moved to the right and the line number and count displayed. If the left arrow (Code 8) has been pressed, the cursor is moved to the left and the line number and count displayed. All other key presses are ignored.

The (*Shudder*) Assembly Language Code

So far we have a BASIC program to initialize the table and to display the graph after program execution. The only thing missing is the program to increment the counts. Since the interrupts occur every 16.7 milliseconds, this program must be in assembly language, the only language fast enough to handle the interrupts.

Assembly language is tedious to learn and difficult in which to program. On the other hand, it's *fast*! Radio Shack currently puts its faith in the OS-9 assembler, discontinuing the excellent *EDTASM+* assembler that runs without OS-9. If you're not an OS-9 fanatic, I'd suggest getting a copy of *EDTASM+* — it's a great package on which to cut your assembly language teeth.

Every one-sixtieth of a second, an IRQ interrupt comes in. The assembly language code must get the current BASIC line number being executed, scan the table for that line number, and then bump by one the count for that line number entry. If a zero line number is encountered, the line number is assumed not to be in the table; the program doesn't do an increment. Line numbers equal to or greater than 10000 are also not incremented. After this action the assembly language code transfers control to the normal IRQ code.

The listing for this assembly language code is shown in Listing 4. The 6809 microprocessor has four registers that are used here. The Y register holds only a zero value, which is loaded in the first instruction. This value is used to test for the Line 0 and cause an exit.

The X register points to the next entry in the table. The table starts at `&H7000`, but the X register is initialized to `&H6FFC`, four bytes less. This is because the increment is made before the test.

The D register — the 16-bit equivalent of the eight-bit A and B registers joined together — hold the current line number. The current line number is picked up from one of those mysterious BASIC variables found in locations `&H68` and `&H69`.

Each time through the `LOOP`, an `LEAX +4,X` instruction is executed. This adds four to the X register. The line number in D is then compared to the location pointed to by the X register. If the two values are not equal, the instruction at `NFND` tests the value in Y (0) against the location pointed to by X. If these are not equal, the end of the table has not been reached; the `LOOP` is reexecuted.

If the line number is found, the count at locations +2 and +3 from the location pointed to by the X register is bumped by one count. This must be done by loading the count into the D register (remember that the count is 16 bits), adding one to the D register (`ADDD #1`) and storing the D register back to the table.

After the increment of the count (or if the line is not found) a `JMP $D8AF` transfers control to the normal IRQ interrupt routine.

When 640 lines are in the program to be tested, the table search takes about 8 milliseconds, leaving half the time left over for program execution. This is a "worst-case scenario," as typical programs will be less than 640 lines.

Relocation

The assembly language program consists of 32 bytes of machine language code on the left (`108E . . . D8`). This code is the executable form of the assembly language listing. It must be transferred to the protected memory area, starting at Location `&H6FAF`. The final program shown in Listing 5 does this by using pokes for each value. (Normally this would be done with `DATA` statements and a `READ/POKE` loop, but we don't want to have the program interfere with `DATA` statements in the program to be tested.) Each poked value corresponds to a machine language byte, transferred during the initialization portion of the program. Once in the protected memory area, they stay there until power is turned off.

Please Break This Chain!

The interrupt vector for the IRQ interrupt processing subroutine is found in the three bytes at `&H10C`. These three bytes are a machine language `JMP` instruction, with the last two bytes indicating the jump address.

The normal way to break an interrupt vector like this is to disable interrupts and put the new address into the second and third bytes of the `JMP`. Interrupts are disabled by the machine language `TFR` instruction that resets an interrupt bit in the Condition Codes register. Because this is tedious to do from BASIC, we made certain that the machine language program started at a location matching the second address byte of the normal interrupt processing subroutine.

The normal interrupt subroutine in the CoCo 3 starts at `&HD8AF`. By making our routine start at `&H6FAF`, only the first byte has to be changed. (Consider what would happen if this were not done: Assuming the new interrupt routine is at `&H6FA0`, the BASIC program changes the second byte of the `JMP $D8AF` to `&H6F`. Now an IRQ interrupt comes in. The microprocessor executes the `JMP`, which is now a `JMP &H6FAF`, 15 bytes into the new routine. Disaster ensues.) In most cases BASIC may be able to change both bytes without an IRQ interrupt coming in, but this approach is better programming practice.

The code in Listing 5 breaks the normal interrupt link by putting the new address of `&H6FAF` into Location `&H10D`. The last instruction of our new routine, don't forget, transfers control to Location `&HD8AF`, the original routine. We were able to sneak our processing in before the normal routine, which still works.

Using the Program

To use the program, merge the program to be tested with the code from Line 10000 onward. Also change or add a `CLEAR` statement to the program to be tested: `100 CLEAR 800, &H6FAE`. At the end of the program to be tested, add a `GOTO 10000`.

After the two programs have been merged, `RUN 10000`.

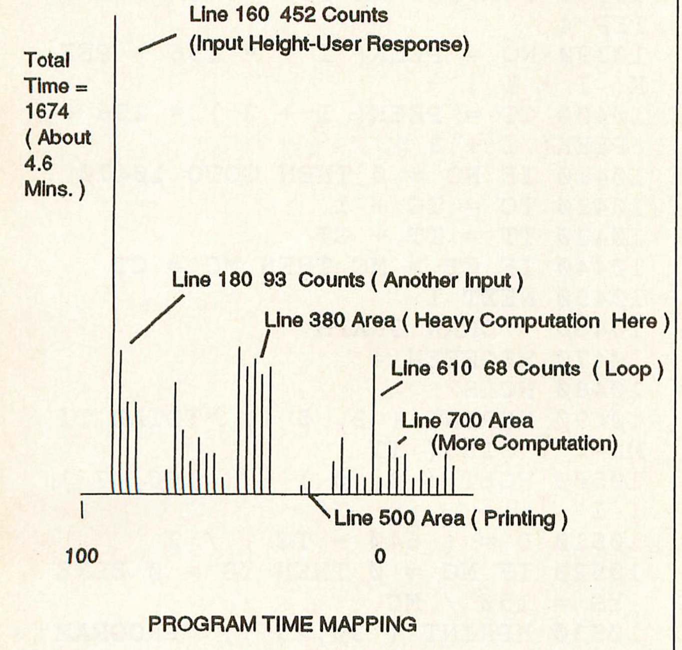


Figure 7: Typical Analysis Display

Choose I in response to the prompt "Initialize or Analyze (I or A)." The *Time Analyzer* program will scan all lines below 10000 and build a table in the `&H7000` area. Break the program after the next prompt, and run the program to be tested as usual.

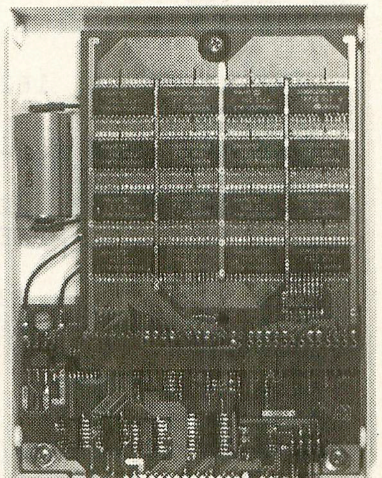
If you have added a `GOTO 10000` at the end of the program to be tested, the program will automatically jump to the prompt message again. This time select A for Analyze. At this point all the counts during program execution have been accumulated. The Analyze function now displays the results. Move the cursor to investigate individual line counts. The total program time in one-sixtieth-second increments is displayed on the left of the screen.

When using the program for inputs, try to avoid long delays in entering data. The program scales the Y plot lines based upon the maximum counts, and `INPUT` statements with long user inputs diminish the plot of the other lines.

Summation

It's fascinating to see how long it takes to test different lines in the program. The display is perfect for finding critical timing problems. You can see which lines are taking the longest and take steps to correct the problem. Figure 7 shows a typical analysis display; this one is for the *Findmaze* program in my February 1988 RAINBOW column (Page 171). This is an 84-line program with a good mix of different types of statements. Note that user input and printing take a relatively long time compared to computation.

That's it! That wasn't so bad, was it? Did you survive? *Hey, are you listening? YOU OUT THERE. . . .* See you next month with more CoCo topics. ☐


SolidDrive™ by Vidicom Corp

SolidDrive™ - a ramdisk that doesn't forget! Fully Static, battery backed CMos ram makes SolidDrive™ ready to use instantly. You can forget formatting and copying work files to ramdisk then copying back your changes to floppy. You can forget fear of power failures. The instant power loss occurs, SolidDrive™ write-protects itself and your valuable work. SolidDrive™ gives you state-of-the-art surface mount technology. That's why we have the best guarantee in the industry - Two years limited repair or replacement! SolidDrive™ is compatible with Multi-Pak® and comes complete with OS9® Level I or II device driver, formatter and self-test software. Available in 512K and 1 Megabyte versions. Factory upgrades available for 512K version. RSDos Driver now available, treats SolidDrive™ as 3 or 6 SSSD RS devices (4-6,4-9), Disk loaded version free on request! 27C64 EProm version $19.00

SolidDrive™ by Vidicom Corp
512K (524,288 bytes) $395.00
1 Meg (1,048,576 bytes) $695.00
Please add $4.00 shipping
Arizona Residients add 5.5% Sales tax
Visa MasterCard orders welcome

SolidDrive™ is the fastest, most reliable long-term storage available to the small computer user!

Vidicom Corp 20 E. Main St. Suite 710
Mesa, AZ 85201 (602) 827-0107
Hours M-F 9:00 am - 5:00 pm MST

OS9 is the trademark of Microware Systems Inc and Motorola Inc. Multi-pak is the trademark of Tandy Corp.

E-Z FRIENDLY For Your CoCo 1, 2, & 3

RAINBOW CERTIFICATION SEAL

Leonardo's Pencil

(Reviewed in Oct. 87 RAINBOW) Makes programming sensational-looking graphics as easy as moving a joystick! Converts precision drawings into "DRAW" commands which can be stand-alone BASIC programs or merged into other programs. Also includes "DEMO" and "PAINT" programs. Requires a spring-centered joystick or touch-pad. 32k ECB **tape or disk $14.95**

?ENIGMA?

Transform your computer into an ultra-secret code machine capable of enciphering and deciphering in over 12 million virtually unbreakable codes! (not simple substitution codes). Print hard copy or store & retrieve coded data on tape or disk. Only the person who has the password can read it! 32k ECB **tape or disk $12.95**

New! EZ Writer

Just answer the prompts & type your message; "EZ WRITER" will put it into perfect letter form and send it to your DMP or DWP. Professional-quality, 1 to 4 page letters every time! Do one letter or multiple copies for "personalized" mailings. Saves letters and mailing lists. Even does labels. Menu-driven. Undoubtedly the EZ-est letter writing system available! Free sample on request! 32k ECB **tape or disk $19.95**

MATH GAMES

FOUR superior educational "games": "RACEWAY", "GO TO THE TOP" (multiplication tables drill), "WORD PROBLEMS", & "PYRAMID". Covers addition, subtraction, multiplication, & division. Different levels of difficulty. Exciting graphics & sounds. EZ and fun! 32k ECB **tape or disk $19.95**

KEYBOARD COMMANDER

Probably the most exciting typing tutor available for your CoCo. You are the commander of a space ship & it's your job to shoot down alien letters & words as they speed toward you & attack your spaceship. Exciting Hi-Res action! 32k ECB **tape or disk $24.95**

E.Z. FRIENDLY SOFTWARE
118 CORLIES AVE. • POUGHKEEPSIE, NY 12601 • (914) 485-8150
(Add $1.50 s/h to all orders. NY residents add state sales tax.)

Listing 1: PRNTLINE

```
100 ' PRINT LINE NUMBERS
110 TC = 0
120 I = PEEK ( &H19 ) * 256 + PE
EK( &H1A )
130 L = PEEK( I ) * 256 + PEEK(
I + 1 )
140 NO = PEEK( I + 2 ) * 256 + P
EEK( I + 3 )
150 IF L = 0 THEN GOTO 200
160 PRINT NO,
170 I = L
180 TC = TC + 1
190 GOTO 130
200 PRINT: PRINT TC; "LINES"
210 END
```

Listing 2: LINETABL

```
100 ' FIND LINE NUMBERS AND PUT
IN TABLE
110 CLEAR 800, &H6FAE
120 J = &H7000
130 I = PEEK ( &H19 ) * 256 + PE
EK( &H1A )
140 L = PEEK( I ) * 256 + PEEK(
I + 1 )
150 NO = PEEK( I + 2 ) * 256 + P
EEK( I + 3 )
160 IF ( L <> 0 ) AND ( NO < 100
00 ) THEN GOTO 200
170 POKE J, 0: POKE J + 1, 0
180 PRINT: PRINT ( J - &H7000 )
/ 4; "LINES"
190 END
200 PRINT NO,
210 POKE J, PEEK( I + 2 ): POKE
J + 1, PEEK( I + 3 )
220 POKE J + 2, 0: POKE J + 3, 0
230 J = J + 4: IF J > &H7000 + 2
560 THEN PRINT "PROGRAM > 640 LI
NES": STOP
240 I = L
250 GOTO 140
```

Listing 3: ANALYZE

```
10340 ' ANALYZE PORTION
10350 HBUFF 1, 400
10360 TC = 0: MC = 0: TT = 0
10370 ' COUNT LINES AND FIND MAX
 VALUE IN TABLE
10380 FOR I = &H7000 TO &H7FFE S
TEP 4
10390 NO = PEEK( I ) * 256 + PEE
K( I + 1 )
10400 CT = PEEK( I + 2 ) * 256 +
 PEEK( I + 3 )
10410 IF NO = 0 THEN GOTO 10470
10420 TC = TC + 1
10430 TT = TT + CT
10440 IF CT > MC THEN MC = CT
10450 NEXT I
10460 ' DRAW GRAPH
10470 HSCREEN 4
10480 HCLS
10490 HPRINT ( 2, 5 ), "TOTAL TI
ME=" + STR$( TT )
10500 HGET ( 0, 0 ) - ( 160, 7 )
, 1
10510 D = ( 640 - TC ) / 2
10520 IF MC = 0 THEN YS = 0 ELSE
 YS = 150 / MC
10530 HPRINT ( 30,23 ), "PROGRAM
 TIME MAPPING"
10540 FOR I = 1 TO TC
10550 Y = PEEK( &H7002 + ( I - 1
 ) * 4 ) * 256 + PEEK( &H7003 +
( I - 1 ) * 4 )
10560 HLINE ( D + I, 160 ) - ( D
 + I, 160 - INT( Y * YS ) ), PSE
T
10570 NEXT I
10580 ' MOVE CURSOR AND PRINT LI
NE AND COUNT
10590 X = D + 1: Y = 162: I = 1:
 C = 0
10600 HLINE (X, 162 ) - ( X, 170
 ), PSET
10610 HPUT ( 272, 176 ) - ( 432,
 183 ), 1, PSET
10620 HPRINT (34,22),PEEK(&H7000
+(I-1)*4)*256 + PEEK(&H7001+(I-1
)*4)
10630 HPRINT (42,22),PEEK(&H7002
+(I-1)*4)*256 + PEEK(&H7003+(I-1
)*4)
10640 A$ = INKEY$: IF A$ = "" TH
EN GOTO 10640
10650 IF A$ = CHR$( 8 ) THEN X =
 X - 1: I = I - 1: IF I < 1 THEN
 X = X + 1: I =        I + 1 ELSE
 HLINE( X + 1, 162 ) - ( X + 1,
170 ), PRESET
10660 IF A$ = CHR$( 9 ) THEN X =
 X + 1: I = I + 1: IF I > TC THE
N X = X - 1:        I = I - 1
ELSE HLINE( X - 1, 162 ) - ( X -
 1, 170 ), PRESET
10670 GOTO 10600
```

Listing 4:

```
6FAF                 00100         ORG     $6FAF
6FAF 108E 0000       00110 START   LDY     #0         TERMINATOR
6FB3 8E   6FFC       00120         LDX     #$6FFC     START OF TABLE-4
6FB6 DC   68         00130         LDD     $68        GET CURRENT LINE #
6FB8 30   04         00140 LOOP    LEAX    +4,X         BUMP TO NEXT ENTRY
6FBA 10A3 84         00150         CMPD    ,X           COMPARE LINE #S
6FBD 26   09         00160         BNE     NFND         GO IF NOT EQUAL
6FBF EC   02         00170         LDD     +2,X         BUMP COUNT
6FC1 C3   0001       00180         ADDD    #1
6FC4 ED   02         00190         STD     +2,X
6FC6 20   05         00200         BRA     OUT          ON TO REST OF INT
6FC8 10AC 84         00210 NFND    CMPY    ,X           END?
6FCB 26   EB         00220         BNE     LOOP         GO IF NO
6FCD 7E   D8AF       00230 OUT     JMP     $D8AF      OUT TO INT PROCESSING
          6FD0       00240 LAST    EQU     *
          0000       00250         END
```

Listing 5: `TIMEFIND`

```
10000 ' PROGRAM TIME ANALYZER
10010 CLS
10020 PRINT "PROGRAM TIME ANALYZ
ER"
10030 INPUT "INITIALIZE OR ANALY
ZE (I OR A)"; RE$
10040 IF RE$ = "A" THEN GOTO 103
50
```

NEW FOR OS-9™: *FORTH09*

from D. P. JOHNSON

FORTH09 is a FORTH-83 Standard implementation specially taylored for OS-9. Includes the double number extension word set, system extension word set, complete forth 6809 assembler and more. Programs written in forth can instantly be saved as compact executable machine language modules. The FORTH09 system runs on any level I or level II OS-9 (6809) machine with at least 32k of available memory and one disk drive. Saved Forth09 application code is romable, reentrant and fully position independent, requiring as little as 3k for a small program. Where maximum speed is required the user can force small code words to be automatically compiled as in line code rather than subroutines. Supplied with complete printed documentation. **$150.00** (+ $3 S&H) Specify disk format if other than CoCo OS-9 format desired.

Other OS-9 SOFTWARE from D. P. JOHNSON

L1 UTILITY PAK - Contains 40 useful utilities that run under both level I and II OS-9. Included are a complete set of "wild card" file handling utilities, a disassembler, a disk sector editor, and the MacGen command language compiler. MacGen will allow you to generate many useful command macros in minutes, much more useful than procedure files. Macro source is included for a macro to implement an archival backup type function. **$49.95**

L2 UTILITY PAK - Contains a Level II "printerr" function that also **shows the pathname being searched for** when "not found" or permission type errors occur. Also contains level II software ram disk driver. Ten other utilities included, some useful for level I also. **$39.95**

L1+L2 COMBINATION PAK both of above together for **$75.00**

SDISK - Standard disk driver module replacement allows full use of 40 or 80 track double sided drives with OS-9 Level I. Full compatibility with CoCo 35 track format and access all other OS-9 non-CoCo formats. Easy installation. **$29.95**

SDISK+BOOTFIX - As above plus boot directly from a double sided diskette. **$35.95**

SDISK3 - Level II version of SDISK driver. Same features as level I (except bootfix not required to boot from double sided). **$29.95**

PC-XFER UTILITIES - Programs to format and transfer files to/from MS-DOS™ diskettes on CoCo under OS-9. (Requires either SDISK or SDISK3 to run depending on which level of OS-9 you are using) **$45.00**

MSF - MS-DOS disk format file manager. More complete file transfer capabiltites for level II only. (Requires SDISK3 to operate). **$45.00**

CCRD 512K byte RAM DISK CARTRIDGE - Operates faster than similar device sold by others. Requires RS Multipak interface, two units may be used together for 1MB. OS-9 Level I & II drivers and test software included. **$CALL**

All diskettes are in CoCo OS-9 format unless otherwise requested; other OS-9 formats can be supplied for $2.00 additional charge. All orders must be prepaid or COD, VISA/MC accepted, add $1.75 S&H for first software item, + .25 for each additional item, $5.00 for CCRD, additional charge for COD.

D. P. Johnson, 7655 S.W. Cedarcrest St., Portland, OR 97223 (503) 244-8152 (For best service call between 9-11 AM Pacific Time, Mon.-Fri.)

OS-9 is a trademark of Microware and Motorola Inc., MS-DOS is a trademark of Microsoft, Inc.

```
10050 ' INITIALIZE PORTION
10060 CLEAR 800,&H6FAE
10070 ' MOVE ML CODE
10080 POKE &H6FAF,&H10:POKE &H6F
B0,&H8E:POKE &H6FB1,&H00:POKE &H
6FB2,&H00
10090 POKE &H6FB3,&H8E:POKE &H6F
B4,&H6F:POKE &H6FB5,&HFC:POKE &H
6FB6,&HDC
10100 POKE &H6FB7,&H68:POKE &H6F
B8,&H30:POKE &H6FB9,&H04:POKE &H
6FBA,&H10
10110 POKE &H6FBB,&HA3:POKE &H6F
BC,&H84:POKE &H6FBD,&H26:POKE &H
6FBE,&H09
10120 POKE &H6FBF,&HEC:POKE &H6F
C0,&H02:POKE &H6FC1,&HC3:POKE &H
6FC2,&H00
10130 POKE &H6FC3,&H01:POKE &H6F
C4,&HED:POKE &H6FC5,&H02:POKE &H
6FC6,&H20
10140 POKE &H6FC7,&H05:POKE &H6F
C8,&H10:POKE &H6FC9,&HAC:POKE &H
6FCA,&H84
10150 POKE &H6FCB,&H26:POKE &H6F
CC,&HEB:POKE &H6FCD,&H7E:POKE &H
6FCE,&HD8
10160 POKE &H6FCF,&HAF
10170 ' CHANGE THE LS BYTE OF NM
I INTERRUPT VECTOR
10180 POKE &H10D, &H6F
10190 ' FIND LINES NUMBERS AND P
UT IN TABLE
10200 J = &H7000
10210 I = PEEK ( &H19 ) * 256 +
PEEK( &H1A )
10220 L = PEEK( I ) * 256 + PEEK
( I + 1 )
10230 NO = PEEK( I + 2 ) * 256 +
 PEEK( I + 3 )
10240 IF ( L <> 0 ) AND ( NO < 1
0000 ) THEN GOTO 10280
10250 POKE J, 0: POKE J + 1, 0
10260 PRINT: PRINT ( J - &H7000
) / 4; "LINES"
10270 GOTO 10030
10280 PRINT NO,
10290 POKE J, PEEK( I + 2 ): POK
E J + 1, PEEK( I + 3 )
10300 POKE J + 2, 0: POKE J + 3,
 0
10310 J = J + 4: IF J > &H7000 +
2560 THEN PRINT "PROGRAM > 640
LINES": STOP
10320 I = L
10330 GOTO 10220
10340 ' ANALYZE PORTION
10350 HBUFF 1, 400
10360 TC = 0: MC = 0: TT = 0
10370 ' COUNT LINES AND FIND MAX
 VALUE IN TABLE
10380 FOR I = &H7000 TO &H7FFE S
TEP 4
10390 NO = PEEK( I ) * 256 + PEE
K( I + 1 )
10400 CT = PEEK( I + 2 ) * 256 +
 PEEK( I + 3 )
10410 IF NO = 0 THEN GOTO 10470
10420 TC = TC + 1
10430 TT = TT + CT
10440 IF CT > MC THEN MC = CT
10450 NEXT I
10460 ' DRAW GRAPH
10470 HSCREEN 4
10480 HCLS
10490 HPRINT ( 2, 5 ), "TOTAL TI
ME=" + STR$( TT )
10500 HGET ( 0, 0 ) - ( 160, 7 )
, 1
10510 D = ( 640 - TC ) / 2
10520 IF MC = 0 THEN YS = 0 ELSE
 YS = 150 / MC
10530 HPRINT ( 30,23 ), "PROGRAM
 TIME MAPPING"
10540 FOR I = 1 TO TC
10550 Y = PEEK( &H7002 + ( I - 1
) * 4 ) * 256 + PEEK( &H7003 +
( I - 1 ) * 4 )
10560 HLINE ( D + I, 160 ) - ( D
+ I, 160 - INT( Y * YS ) ), PSE
T
10570 NEXT I
10580 ' MOVE CURSOR AND PRINT LI
NE AND COUNT
10590 X = D + 1: Y = 162: I = 1:
 C = 0
10600 HLINE (X, 162 ) - ( X, 170
 ), PSET
10610 HPUT ( 272, 176 ) - ( 432,
 183 ), 1, PSET
10620 HPRINT (34,22),PEEK(&H7000
+(I-1)*4)*256 + PEEK(&H7001+(I-1
)*4)
10630 HPRINT (42,22),PEEK(&H7002
+(I-1)*4)*256 + PEEK(&H7003+(I-1
)*4)
10640 A$ = INKEY$: IF A$ = "" TH
EN GOTO 10640
10650 IF A$ = CHR$( 8 ) THEN X =
 X - 1: I = I - 1: IF I < 1 THEN
 X = X + 1: I =        I + 1 ELSE
 HLINE( X + 1, 162 ) - ( X + 1,
 170 ), PRESET
10660 IF A$ = CHR$( 9 ) THEN X =
 X + 1: I = I + 1: IF I > TC THE
N X = X - 1:         I = I - 1
ELSE HLINE( X - 1, 162 ) - ( X -
 1, 170 ), PRESET
10670 GOTO 10600
```

XTEAM & OS-9 BOTH WINNERS

All of our OS-9 products work with:
OS-9 version 1
OS-9 version 2
OS-9 Level 2

XTERM

OS-9 Communications program

- Menu oriented
- Upload/download Ascii or XMODEM protocol
- Execute OS-9 commands from within XTERM
- Definable macro keys
- Works with standard serial port, RS232 Pak, or PBJ 2SP Pack, Includes all drivers
- Works with standard screen, Xscreen WORDPAK or DISTO 80 column board

$49.95 with source **$89.95**

XDIR & XCAL

Hierarchial directory
- Full sorting
- Complete pattern matching

OS-9 calculator
- Decimal, Hex, Binary
- +,-,*,/,AND,OR,XOR,NOT

$24.95 with source **$49.95**

XDIS

OS-9 disassembler

$34.95 with source **$54.95**

HARDWARE

512k memory upgrade $80.00

Ram Software
Ram Disk
Print Spooler
Quick Backup

All three for only $19.95

*Software by ColorVenture

XWORD

OS-9 word processing system

- Works with standard text screen, XSCREEN, WORDPAK, or DISTO
- True character oriented full screen editing
- Full block commands
- Find and Replace commands
- Execute OS-9 commands from within
- Proportional spacing supported
- Full printer control, character size, emphasized, italics, overstrike, underline, super/sub-scripts
- 10 header/footers
- Page numbering in decimal or Roman numerals
- Margins and headers can be set different for even and odd pages

$69.95 with source **$124.95**

XMERGE

Mail merge capabilities for XWORD

$24.95 with source **$49.95**

XSPELL

OS-9 spelling checker, with 20000 and 40000 word dictionaries

$39.95

XTRIO

XWORD/XMERGE/XSPELL

$114.95 with source **$199.95**

XED

OS-9 full screen editor

$39.95 with source **$79.95**

AND FOR RS DOS ...

Call for package price

SMALL BUSINESS ACCOUTING

This sales-based accounting package is designed for the non-accountant oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. Includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vender status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List.

$79.95

INVENTORY CONTROL/SALES ANALYSIS

This module is designed to handle inventory control, with user defined product codes, and produce a detailed analysis of the business' sales and the sales force. One may enter/update inventory data, enter sales, run five sales analysis reports, run five inventory reports, set up product codes, enter/update salesman records, and update the SBAP inventory.

$59.95

PAYROLL

Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Aditional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware

$59.95

PERSONAL BOOKKEEPING 2000

Handles 45 accounts. Enters cash expenses as easily as checks. Handles 26 expense categories. Menu driven and user friendly.

$39.95

ACCOUNTS RECEIVABLE

Includes detailed audit trails and history reports for each customer, perpares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accting package.

$59.95

ACCOUNTS PAYABLE

Designed for the maintenance of vendor and A/P invoice files. The system prints checks, voids checks, cancels checks, deletes cancelled checks, and deletes paid A/P invoices. The user can run a Vendor List, Vendor Status report, Vendor Aged report, and an A/P Check Register. This package can be used either as a standalone A/P system or can be integrated with the Small Business Accounting Package.

$59.95

MICROTECH CONSULTANTS INC.

1906 Jerrold Avenue
St. Paul, MN 55112

Dealer Inquiries Invited
Author Submissions accepted
OS-9 is a trademark of Microware

VISA MasterCard

Ordering Information
Add $3.00 shipping & handling, MN residents add 6% sales tax.
Visa, Mastercard, COD (add $3.50), personal checks.

(612) 633-6161

KISSable OS-9

Volunteers Build a Better Mousetrap

By Dale L. Puckett
Rainbow Contributing Editor

The OS-9 wizards stole the show at our RAINBOWfest Chicago seminar. Two products demonstrated by Kevin Darling, Mark Griffith, Ron Lammardo and Kent Meyers redefined ease of use for Color Computer OS-9. Several others were spectacular and brought oohs and ahhs from the crowd. Most importantly, however, these OS-9 Users Group members have released their work into the public domain and were distributing it to Users Group members at RAINBOWfest Chicago.

We were also fortunate enough to interview a rising young star in the Color Computer OS-9 community. We'll share Chris Burke's views with you this month and then move on to get you started with a few lines of code that may soon become *Gfx3*.

During our seminar, Darling and Lammardo put the new Kent Meyers *GShell* through its paces. The new addition to the OS-9 Users Group Software Library contains six files as well as the `ar` and `ipatch` utilities you need to install them. They include:

`GShell.ipc`	an `Ipatch` file
`CC3io.ipc`	an `Ipatch` file
`Scf.ipc`	an `Ipatch` file
`Gsort`	a new command for the file
`MenuCopy`	a replacement for Tandy's `copy` command
`Free`	a replacement for Tandy's `free` command

You must purchase OS-9 Level II and *Multi-Vue* from Tandy to get the original `GShell`, `CC3io` and `Scf` files you'll be patching. These programs have been copyrighted by Microware and Tandy, and you may not distribute them. The `ipatch` files are in the public domain, however, and may be passed around freely as long as no files from OS-9 Level II or *Multi-Vue* are included. The three new utility commands are all in the public domain.

Here are some of the new features the crowd saw at our OS-9 seminar. Typing `S` when the *GShell* window is active pops up an overlay window and starts a standard OS-9 Shell. You can then run OS-9 from the command line to your heart's content. Return to *GShell* by holding down the CTRL key and striking the BREAK key.

If you select any file or directory on the *GShell* screen by pointing to it and clicking once, you can delete it by moving the mouse pointer to the trash can icon and clicking again. The new *GShell* deletes the file immediately without asking you if you are sure. It uses the OS-9 `Del` utility to delete a file and the `Deldir` utility to delete a directory.

If you double click on any text file icon, *GShell* assumes it is a valid OS-9 procedure file and attempts to execute it as a shell script. If you try to execute a file that does not contain a shell script, OS-9 will print an error message.

If you double click on any program icon, *GShell* will run the program for you after asking for any parameters. *GShell* knows a file is a program when it finds the `execute attributes` set. Additionally, you may now list and print an `AIF` file by selecting it and using the appropriate command in the Files menu.

You'll find a new command in the Files menu now. `Sort` causes all files in the directory displayed to be sorted in ASCII order. This means your `AIF` files always move to the beginning of a directory and appear in the first screen.

You'll notice another convenience when you need to answer the infamous "Are you sure?" prompt. The "sure" box is now displayed on the screen very close to the last position of the mouse pointer. Before, it was always displayed near the center. This Kent Meyers addition will help you keep your mouse movements to a minimum.

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, K0HYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

If all of these new features aren't enough, hang on to your hat — there's more! Directory names longer than the directory bar now scroll to the left. `Graphics Put` buffers in use are now killed on entry and exit. A black border has been added to all *GShell* and Tandy menu shells. You may also select a 16-color 40-by-24 window from the View menu.

Since Meyers is a stickler for detail, all *GShell* prompts now start with capital letters. This makes them look more professional. Adding a question mark in the second line of an `AIF` file now causes *GShell* to prompt you for parameters before executing the program. And if you find a prompt on your screen and don't have an answer, clicking the mouse will cause the prompt to go away and the function you were running to be aborted.

When you do have something to say, you'll have more room. Meyers has expanded the size of the "Parameters for" box by 10 spaces. If you click on a file icon that has an `AIF` file associated with it, the program name, parameters and finally the filename are sent to the shell.

Clicking first on any program file icon and then clicking on the question mark in the upper right corner of the menu bar, or selecting the `Help` command from the Tandy menu, gives you help for that program — if it's available in the help file in your system directory.

Additionally, programs that run in *GShell*'s overlay window now run with the mouse and the graphics pointer turned off. This makes them much faster. When a display scrolling in the *GShell* overlay window pauses, it can be restarted by clicking the mouse. To use this option you must patch the `CC3io` and `Scf` modules with the files on the disk. The bug that once caused your window to disappear when you quit `GShell` after starting it with `Multistart` or `AutoEx` has been fixed.

While he was adding these new features, Meyers optimized *GShell+* and removed all the bugs he could find. *GShell+* is far more reliable than the original version and much faster. The `CC3io` and `Scf` patch files on the disk give you the following features and fixes:

> CoCo 3 defaults to `montype` RGB when you boot OS-9.
> A palette register problem has been fixed.
> Condemned processes are killed automatically.
> The mouse button can be used to unpause a screen.
> The un-pause feature also works outside of *GShell* in any OS-9 window or `SCF`-type device.

Following the *GShell* demonstration Ron Lammardo answered questions about the new *Shell+* he masterminded and helped develop. The Users Group distributed Version 1.3a on the `GShell` disk at RAINBOWfest.

After Lammardo spoke, Kevin Darling stole the show by playing an audio cut from *Star Trek*. He then held the microphone to the CoCo 3 speaker while he played an additional dozen sounds, including the infamous blurb that describes more than one writer on deadline: "I'm trying to think, but nothing happens!"

Darling also awed the crowd with a few animated high-resolution graphics screens. In one, a waterfall lulls you with its serenity. In another, a jet flies over the earth's surface at varying speeds. The player program doing the work was named *Vefio*. Darling played back the images by double clicking on *Multi-Vue* icons.

Mark Griffith wrote the new `Copy` command distributed by the Users Group at Chicago. It is a direct replacement for the standard copy utility. However, it works only with *Multi-Vue*. Run Griffith's `Copy` by selecting a file and then choosing Copy on the Files menu. The first thing you'll see is a pop-up overlay window. If you are copying a file to the same directory, you need only type a filename. If you want to make a copy in another directory or on another disk, you type just the device name and directory. You no longer need to retype the filename you selected earlier with the mouse. If the new name you type already exists, an overlay window will pop up, and you'll be asked if you want to overwrite the existing file.

While the OS-9 wizards were wowing the seminar crowd, Tony DiStefano was doing the same with his new Super Controller II at the CRC booth. This board does not halt the 6809 processor while it is reading from or writing to the disk. This returns OS-9's type-ahead feature to the Color Computer.

Kevin Darling wrote the OS-9 drivers for CRC. We picked up a final production copy of Darling's drivers at Chicago and while reading the manual on the flight back to Washington, came across a discussion of the infamous "`OS-9 Boot` file order problem." Here's a common problem: Your new disk won't boot under Level II. Before you blame your new controller or your Color Computer, answer the following questions:

> Have you remembered to include a `CMDS` directory on your boot disk?
> Does it contain a `Shell` file and `Grfdrv`?
> Are the execution permissions set: `attr /d0/cmds/shell e pe`?

This is a pretty common problem, even among the oldtimers. If you answered the questions above correctly, you may have stumbled into the infamous "boot order" failure. Here are the symptoms: Your disk fails to boot at all, or — more often — when you format a disk you wind up with many Read Errors.

All the major Level II third-party software and hardware makers are aware of this problem, but so far, no one has come up with a satisfactory explanation. It happens most often when you add a new module to your boot list or `Config` list. Theoretically, since all OS-9 code is position-independent, it shouldn't matter where a driver module ends up. There are many theories about what causes this failure, but the only known "fix" is to rearrange the order of the modules in your `OS-9 Boot` file.

CRC distributes one of Darling's programs, *DirM*, to help you determine a possible boot order if you run into trouble. *DirM* is similar to *Mdir*, except it reports the actual RAM block numbers that hold your modules. The prevailing theory is that `RBF`, `CC3Disk`, `DD`, `D0`, `D1`, as well as other `RBF` drivers and descriptors, should all end up with the same block number when you boot up.

If you have a problem but can boot up, run *DirM*. Note the first number on the lines for those modules. If they differ, you may have found the trouble. Try another `Os9gen` boot list order by using your editor to move a module name or two in your boot list file — either from before the `RBF` modules to after them or vice versa. Remember, your goal is to make those `RBF`-type modules wind up in the same 8K block of memory.

A common first try is to simply move the `Init` module to the end of the list. This has worked for many people. Because no one actually knows what causes this problem, Darling recommends that you do not make backups of important disks until you've tried out the drivers for a couple of days. How-

```
RSDos -cmd [-mod] device-name [DOS-path] [OS9-path] Switches
```

`-dir`	for a directory listing of an RS-DOS disk
`-get`	to import a file from an RS-DOS disk
`-del`	to delete a file from an RS-DOS disk
`-put`	to export a file to an RS-DOS disk

`Modifiers`

`-b`	for type 0: BASIC binary type program
`-d`	for type 1: BASIC data file
`-m`	for type 2: executable machine language program
`-t`	for type 3: text editor source file
`-a`	for ASCII format (default is binary)
`-f=n`	sets the file type to n (n = 0-255)

Figure 1

ever, if you can format new disks with no difficulty and can copy large files such as `OS9boot` to another disk without errors, you are most likely in good shape.

When you buy the Super Controller II, you get several extra utilities. `RS-DOS` from `Ipatch` author Bob Santy is one that is sure to please. This import/export utility displays directories, transfers files to and from a Color Computer RS-DOS diskette and deletes files from RS-DOS diskettes.

The syntax and a list of switches and modifiers accepted by `RSDos.os9` are shown in Figure 1.

Tony DiStefano plans to add a combination clock, parallel port and serial port card to the Disto lineup soon. This card can be installed inside the SC-II and means you may no longer need to use the Multi-Pak Interface. Rumor control has it that another board with four devices will be available from CRC in the not-too-distant future.

FD 502 Double-Sided 40-track Secondary Drive Fix

See pg 163

When I read Kevin Darling's description of the boot list order problem in the Disto Super Controller II driver documentation, it reminded me of another problem he mentioned. The Color Computer normally turns on both drive motors, even though it selects only one drive for access at a time. This ensures that when you are running a copy utility to move files between drives, you need not wait for a drive to spin up to 300 rpm each time your program switches from Drive 0 to Drive 1. Because of this convention, *all* disk drivers for the Color Computer assume that all drives are ready to use if the motor line is on. In the past this has been true.

Now for the "gotcha!" The second disk drive used in the two-drive FD 502 cases has a jumper inadvertently misplaced. These drives ignore the motor line and spin only when selected. This means that every time you see your Drive 1 light go on, it takes a fraction of a second for it to get up to speed. When the light goes out, the drive stops. This makes disk operations unreliable.

You may not have a problem while running RS-DOS programs because they normally run at 1 MHz. If you are using OS-9 with the vanilla Level II `CC3Disk` module, you may have occasional problems — especially when copying from `/D0` to `/D1`. If you are using the new Disto Super Controller II with the no-halt drivers, you must fix the jumper.

To see if your drive acts this way, loosen the four outside screws that hold the case together. Observe the top of Drive 1 while trying `POKE &HFF40,2`. If the motor and light come on, you need to change the jumper. To do this, remove the top drive. Remove the two screws holding the fan and lay it back out of the way. Now, pull off the black/yellow/red power cable and the main 34-wire control cable. Slide the drive out, being careful to hold it up so it doesn't fall on the bottom drive. Remove the two flat plastic head/sensor cables that connect to the circuit board by lifting up on the top of the plastic block they plug into. This releases the tension lock on the cables so that they will pull out easily.

Also, remove the four-pin cable that leads forward to the index-hole and write-protect sensors. Flip the drive over and remove the three screws that hold the circuit board. Remove the two cables attached to the motors. Look at the top of the circuit board, and note where the cable to the controller plugs in. You should see two small bare-wire jumpers soldered to the board; ignore the one near Pin 34. On the side nearest Pin 2 of the 34-pin edge card, in one of two sets of holes marked '5' you'll find another. Remove or clip it, then run a wire between the other marked set of holes. Be careful when you solder in the new jumper.

Put everything back together and type `POKE &HFF40,2`. The light should come on, but the motor will not be running. Now type `POKE &HFF40,8`. The motor should come on but the light should stay out. Try `POKE &HFF40,10`. The motor and light should both come on. Finally, type `POKE &HFF40,0`. Both the motor and light should go off — you passed the test!

Chris Burke — A Rising OS-9 Star

Chris Burke and his wife, Trisha, sell OS-9 and RS-DOS hard disks and OS-9 utilities. They live in Schaumburg, Ill., only two miles from the site of RAINBOWfest Chicago. Their Color Computer adventure began in 1982 when they bought a Color Computer with Level I OS-9 for $500. They bought it because it was the least expensive graphics-based computer available at the time and because the 6809 is a good processor. "I couldn't find a better value anywhere," Burke said.

Burke started out writing programs in Extended Color BASIC, but he soon added OS-9 and discovered that he really liked it. "OS-9 was like UNIX, and I was familiar with UNIX. OS-9 made a lot of sense because of its modular structure.

"Before long, I set up some quad density drives and got involved with the local OS-9 Users Group. I made a presentation one evening to show them how to put these big drives on the CoCo. A lot of people went out and did it. I wrote a lot of 'fun' OS-9 stuff — device drivers, etc. — and added a lot of hardware. I even built something like the Super Board. But I still wasn't in business," Burke said.

Burke thought the quad density drives were nice but decided he needed something more. "I saw a few hard drives advertised in RAINBOW for about $900," he said. "Unfortunately, that was out of the question — I didn't have that kind of money. Luckily, I noticed a few drives advertised in *Byte* magazine for $450 a few months later. I knew a little bit about the drives, so I went to work and got OS-9 Level I running on a hard drive. Then I got OS-9 Level II and wrote another driver.

"This was about two years ago and we still weren't in business, but about that time, Trisha and I noticed one of Marty Goodman's columns in RAINBOW. He was telling why Color Computer hard drives were so expensive, while IBM hard drives were cheap. We were already using an IBM drive on our Color Computer, so the 'light' went on and we decided to go in business. Our only product was an OS-9 hard disk interface called the CoCo-XT."

Burke still doesn't sell the drives — just the interface and the software. He hasn't jumped into this arena because he believes everyone knows you can still get a better deal on an IBM drive through one of the large discount houses. Later Burke added a real-time clock with battery backup to his XT and called it the XT-RTC.

He showed both interfaces at local computer clubs and RAINBOWfest Princeton. "That was our first public offering, and our products were well-received. A few people were hesitant because they had never heard of us before; when they saw our $450 price, they thought we were setting them up. Then people started calling and asking if they could sell for us — Sugar Software, Howard Medical, FHL all wanted to sell Burke's hard disk interface.

"Before we came along, hard disks had been a closed market. For a long time there was only Owl-Ware. Then Disto added a hard disk interface to its line. Ours was something dealers could sell, so we put it in distribution immediately."

After this initial success, Chris and Trisha started expanding their product line. They added *Hyper-IO*, a program that lets you use a hard drive under BASIC. It is OS-9 compatible and stores an entire floppy image as one OS-9 file. You can delete or add a whole floppy at the same time. This means you can run OS-9 and RS-DOS programs from the same hard drive, although not concurrently. *Hyper-IO* gives RS-DOS users the advantage of making their floppy images any size.

The floppy on your hard disk can look like a double-sided 80-track, a 3-megabyte drive, or whatever. Another nice thing about *Hyper-IO* is the fact that it gives you the ability to add utilities to transfer files from OS-9 to RS-DOS — on a hard drive or a floppy. Burke also gives you a patch that lets the OS-9 assembler create RS-DOS programs. After you assemble them, you can copy them to an RS-DOS directory.

Yet, for Burke, *Hyper-IO* was only a beginning. Before long, he found himself designing *RSB*, which stands for *Radio Shack BASIC*. "People say they don't like OS-9 because it's hard to use and hard to learn," Burke said. "I don't believe it is hard to use. I believe it's different from what they have learned. What they mean when they say OS-9 is hard to use is that when they type `run game` it doesn't work."

RSB uses the same command syntax as *Hyper-IO*, but it runs in an OS-9 shell. All of the *Radio Shack Basic* graphics commands have been modified to use OS-9 Level II system calls. "When you run *RSB* the first time, we take the BASIC code in ROM and move it to your hard disk," Burke said. "Then we patch the I/O drivers to make system calls and patch the code to make it relocatable. Since we only had to change about 10 percent of code, *RSB* was a reasonable project."

Burke's goal is to make OS-9 appear friendly to people who use RS-DOS regularly. He believes that once they start using *RSB*, they will become familiar with OS-9's features — the spoolers, hard drives, additional serial ports, etc. — because *RSB* uses OS-9 drivers. "At the same time they are running *RSB*, they will be able to flip over to another window and use an OS-9 application program. In fact, because of OS-9 *RSB* users will even be able to run several different RS-DOS programs in different windows at the same time. All of this will be going on concurrently!" Burke said.

Burke is presently working on *MUSE*, an `Scf` driver for music that will play a string from *RSB*. Since he is writing it as a device driver and device descriptor named `/MU`, you will be able to use it with your Radio Shack Sound Pack or the Super Voice cartridge from Speech Systems. In fact, you will have a no-halt music device in a sense, because the two boards take a string and play it. The Level II internals will generate the sounds.

Another OS-9 utility marketed by Burke & Burke is `EZGen`, a boot file editor similar to the Sugar Software `Patcher` utility. With it, when you get an upgrade of a device driver, you need only type `EZGen /d0 /os9boot`, link to `Cc3disk` and then type `u`, followed by a path list to the new driver. `EZGen` will pull out the old driver and put the new one in your boot file, making sure your boot file stays contiguous.

Burke & Burke also markets a utili-

THE BEST COCO ASSEMBLY LANGUAGE PROGRAMMING BOOKS IN PRINT

"Assembly Language Programming for the CoCo" (The Book) and the CoCo 3 (The Addendum). Professionally produced (not just skimpy technical specifications). THE CoCo reference books.

THE BOOK - 289 pages of teaching assembly language for the CoCo 1 & 2. It's used as a school text and is an intro to Computer Science. It describes the 6809E instructions, subroutines, interrupts, stacks, programming philosophy, and many examples. Also covered are PIAs, VDG, SAM, kybd, jystk, sound, serial port, and using cassette and disk. $18.00 + $1.50 s/h.

THE ADDENDUM - Picks up where the BOOK left off. Describes ALL the CoCo 3 enhancements & how to use them with assembly language. The most complete GIME spec. WOW - Super-Res Graphics, Virtual Memory, New Interrupts, and more information not available elsewhere. Find out what the CoCo 3 can really do. $12.00 + $1.00 s/h.

COCO 3 SPECIAL Start your CoCo library right. See what the CoCo can really do and save money - buy the BOOK and ADDENDUM for only $27.00 + $2.00 s/h.

US check or money order. RI orders add 6% sales tax

TEPCO
68 James Court
Portsmouth, RI 02871

See Us On DELPHI

ties disk that features `Wild` and `Mv`. `Wild` has a recursive option and can handle commands like `wild -kp asm *.src o*` or `wild del c.temp*`. `Mv` will move a directory entry from one point on the tree to another. When it runs, it moves the directory entry to a different directory, leaving the files in the same directory.

All Burke & Burke utilities are written in C, while all device drivers are written in assembly. Why does Chris Burke use OS-9? "Because like UNIX it's modular," he said. "When you add something, you don't need to learn a whole bunch of stuff over again. When you add a hard drive, it acts just like a floppy drive. Besides, it does multitasking and uses windows.

"The OS-9 windows are far better than MS-DOS windows because they are true multitasking windows," Burke said. "*MS Windows* is merely a 'kluge' on top of MS-DOS. Besides, if you time the Color Computer 3 running OS-9 Level II against an IBM XT, you'll find the CoCo is faster in most applications."

What does Burke see in the future for OS-9? "I think we need to get a lot of people writing OS-9 software. We need to get some good programs that will attract users. Once more users are attracted, more people will want to write programs. I think OS-9 has a really good future because it's a really good operating system. The 68K version is the standard for compact disk interaction, and someday there will be software running on OS-9 that is just as good as any running on MS-DOS."

Our Listing

This month we give you the framework of *Gfx3*. Feel free to tailor it to meet your desires. Once you type this subroutine package in and pack it, you can merge it with *Gfx2* and tap the functionality built into OS-9's `WindInt` manager interactively from within your BASIC09 programs — just like you use the graphics primitives with *Gfx2* now.

The day I started this month's column, I received an E-mail letter with *WizPro* attached from author Bill Brady. You won't believe your eyes. *WizPro* is not only the first 128K program for the Color Computer 3 — it's the first extendable communications program for the CoCo 3. Digest that thought for a while, and I'll be back to tell you more about this fantastic product next month. Until then, keep on hacking! ☐

The listing: `Gfx3`

```
PROCEDURE gfx3
 0000      (* Add Basic09 functions to use WindInt functionality
 0035      (* Syntax: run gfx3([path,]"Action",params)
 0060
 0061      PARAM path:BYTE
 0068      PARAM action:STRING[12]
 0074      PARAM one,two,three,four:INTEGER
 0087
 0088      TYPE Registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 00AD      DIM Regs:Registers
 00B6
 00B7      DIM F_Icpt,F_Sleep:BYTE
 00C2      DIM I_Getstt,SS_MnSel:BYTE
 00CD      DIM I_SetStt,SS_MsSig,StdIn,SS_GIP,SS_Mouse:BYTE
 00E4      DIM ss_sbar,ss_wnset,ss_umbar,gs_mouse:BYTE
 00F7      DIM gs_opt,ss_ssig,ss_rel,ss_scsiz,gs_palt:BYTE
 010E      DIM gs_kysns,ss_styp,ss_fbrg,ss_mtyp:BYTE
 0121      DIM MouseSig,Follow:INTEGER
 012C      DIM Grp_Ptr,Ptr_Arr:BYTE
 0137
 0138      Grp_Ptr:=202
 013F      Ptr_Arr:=1
 0146      F_Icpt:=$09
 014E      F_Sleep:=$0A
 0156      I_Getstt:=$8D
 015E      I_SetStt:=$8E
 0166      SS_MsSig:=$8A
 016E      SS_MnSel:=$87
 0176      SS_GIP:=$94
 017E      SS_Mouse:=$89
 0186      ss_sbar:=$88
 018E      ss_wnset:=$86
 0196      ss_umbar:=$95
 019E      gs_opt:=$00
 01A6      ss_ssig:=$1A
 01AE      ss_rel:=$1B
 01B6      ss_scsiz:=$26
 01BE      gs_palt:=$91
 01C6      gs_kysns:=$27
 01CE      ss_styp:=$93
 01D6      ss_fbrg:=$96
 01DE      ss_mtyp:=$92
 01E6      Follow:=1
 01ED      MouseSig:=10
 01F4
 01F5      DIM EndStr:STRING[1]
 0201      DIM Null,CallCode,FunCode:BYTE
 0210      Null:=0
 0217      EndStr:=CHR$(Null)
 0220      StdOut:=1 \StdIn:=0
 022F
 0230      (* End definitions
 0242
 0243
 0244
 0245      IF LEFT$(action,1)="_" THEN GOSUB 10000
 0258        ON act GOSUB 1000,2000,3000,4000,5000,6Q00,7000,8000,9000
 0284        END
 0286      ENDIF
 0288
 0289      IF action="ss.sbar" THEN act:=100
 02A3      ELSE IF action="ss.wnset" THEN act:=200
 02C1        ELSE IF action="ss.umbar" THEN act:=300
 02E0          ELSE IF action="ss.mnsel" THEN act:=400
 02FF            ELSE IF action="ss.msig" THEN act:=500
 031D              ELSE IF action="ss.mous" THEN act:=600
 033B                ELSE IF action="gs.mous" THEN act:=700
 0359                  ELSE IF action="ss.gip" THEN act:=800
 0376                    ENDIF
 0378                  ENDIF
 037A                ENDIF
 037C              ENDIF
 037E            ENDIF
```

```
0380           ENDIF
0382         ENDIF
0384       ENDIF
0386
0387       ON act GOSUB 100,200,300,400,500,600,700,800
03AF       END
03B1
03B2 100   CallCode:=I_SetStt
03BD       Regs.a:=path
03C9       Regs.b:=ss_sbar
03D5       Regs.x:=one \(* contains horiz position
03FB       Regs.y:=two \(* contains vertical postion
0423       RETURN
0425
0426 200   CallCode:=I_SetStt \(* Set Status Code
0443       Regs.a:=path
044F       Regs.b:=ss_wnset
045B       Regs.x:=one \(* address of window structure
0485       Regs.y:=two \(* window type code
04A4       RUN SysCall(CallCode,Regs)
04B3       RETURN
04B5
04B6 300   CallCode:=I_SetStt \(* Set Status Code
04D3       Regs.a:=path
04DF       Regs.b:=ss_umbar
04EB       RETURN
04ED
04EE 400   Regs.a:=path
04FD       Regs.b:=SS_MnSel
0509       CallCode:=I_Getstt
0511       RUN SysCall(CallCode,Regs)
0520       one:=Regs.a \(* contains Menu ID Number
0545       two:=Regs.b \(* contains Menu Item Number
056C       RETURN
056E
056F 500   Regs.a:=path
057E       Regs.b:=SS_MsSig
058A       Regs.x:=one \(* contains requested signal code
05B7       CallCode:=I_SetStt
05BF       RUN SysCall(CallCode,Regs)
05CE       RETURN
05D0
05D1 600   Regs.a:=path
05E0       Regs.b:=SS_Mouse
05EC       Regs.x:=one \(* Update / timeout info
0610       Regs.y:=two \(* Follow=1, NoFollow=0
0633       CallCode:=I_SetStt
063B       RUN SysCall(CallCode,Regs)
064A       RETURN
064C
064D 700   Regs.a:=path
065C       Regs.b:=SS_Mouse
0668       Regs.x:=one \(* address of mouse packet
068E       CallCode:=I_Getstt
0696       RUN SysCall(CallCode,Regs)
06A5       one:=Regs.x \(* address of mouse packet
06CA       RETURN
06CC
06CD 800   Regs.a:=path
06DC       Regs.b:=SS_GIP
06E8       Regs.x:=one \(* Resolution, Port Location
0710       Regs.y:=two \(* Repeat start, repeat delay
0739       CallCode:=I_SetStt
0741       RUN SysCall(CallCode,Regs)
0750       RETURN
0752
0753 1000  CallCode:=I_Getstt
075E       Regs.a:=path
076A       Regs.b:=gs_opt
0776       Regs.x:=one \(* packet address of options
079E       RUN SysCall(CallCode,Regs)
07AD       RETURN
07AF
07B0 2000  CallCode:=I_SetStt
07BB       Regs.a:=path
```

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

WHAT TO WRITE: We are interested in what you may wish to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs which can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included on the tape or disk using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

COMPENSATION: We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

Protect and highlight your important magazine collection with sturdy RAINBOW binders

RAINBOW
RAINBOW
CoCo Power!

Distinctive, Durable RAINBOW Binders

THE RAINBOW is a vital resource to be referred to again and again. Keep your copies of THE RAINBOW safe in our quality, distinctive binders that provide complete protection.

These **attractive red vinyl binders** showcase your collection and ensure your RAINBOWs are in mint condition for future use. Each binder is **richly embossed with the magazine's name in gold** on the front and spine. They make a handsome addition to any room.

Put an End to Clutter

Organize your workspace with these tasteful binders. Spend more time with your CoCo and eliminate those frustrating searches for misplaced magazines.

A set of two binders, which holds a full 12 issues of THE RAINBOW, is only $13.50 (plus $2.50 shipping and handling).

Special Discounts on Past Issues

To help you complete your collection of THE RAINBOW, we're offering a **special discount on past issues** of the magazine.

When you place an order for six or more back issues of THE RAINBOW at the same time you order binders, you are entitled to $1 off the regular back issue price. To order, please see the "Back Issue Information" page in this issue.

Know Where to Look

You may purchase the "Official And Compleat Index To THE RAINBOW" for $1 when you purchase a set of binders. This comprehensive index of RAINBOW's first three years (July 1981 through July 1984) is usually priced at $2.50.

For greater convenience, order RAINBOW Binders through the shopping area of the CoCo SIG of Delphi!

____ **YES**. Please send me ________ set(s) of RAINBOW binders

Take advantage of these special offers with your binder purchase:

____ Save $1 off the single issue cover price for back issues. Minimum order of 6 magazines. Please enclose a back issue order form from a recent issue indicating magazines wanted.

____ Purchase the "Official and Compleat Index to THE RAINBOW" for $1. (Regular price $2.50.)

(These offers good only with the purchase of a RAINBOW binder set)

Name ____________________
Address ____________________
City ____________________ State __________ ZIP __________
☐ My check in the amount of ________ is enclosed. (In order to hold down costs, we do not bill.)
Charge to: ☐ VISA ☐ MasterCard ☐ American Express
Account Number ____________________ Expiration Date __________
Signature ____________________

Mail to: **Rainbow Binders, The Falsoft Building, P.O. Box 385, Prospect, KY 40059.**

Binders are $13.50 per two-binder set plus $2.50 shipping and handling. If your order is to be sent via U.S. mail to a post office box or foreign country, please add $2. Kentucky residents add 5% sales tax. U.S. currency only, please. In order to hold down non-editorial costs, we do not bill.

For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST
All other inquiries call (502) 228-4492.

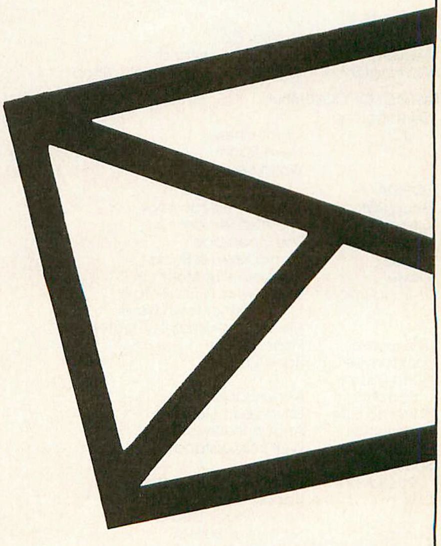
```
07C7       Regs.b:=ss_ssig
07D3       Regs.x:=one \(* contains requested signal code
0800       RUN SysCall(CallCode,Regs)
080F       RETURN
0811
0812 3000 CallCode:=I_SetStt
081D       Regs.a:=path
0829       Regs.b:=ss_rel
0835       RUN SysCall(CallCode,Regs)
0844       RETURN
0846
0847 4000 CallCode:=I_SetStt
0852       Regs.a:=path
085E       Regs.b:=ss_scsiz
086A       RUN SysCall(CallCode,Regs)
0879       one:=Regs.x \(* contains number of columns
08A1       two:=Regs.y \(* contains number of rows
08C6       RETURN
08C8
08C9 5000 CallCode:=I_Getstt
08D4       Regs.a:=path
08E0       Regs.b:=gs_palt
08EC       RUN SysCall(CallCode,Regs)
08FB       RETURN
08FD
08FE 6000 CallCode:=I_Getstt
0909       Regs.a:=path
0915       Regs.b:=gs_kysns
0921       RUN SysCall(CallCode,Regs)
0930       one:=Regs.a \(* contains keyboard scan info
0959       RETURN
095B
095C 7000 CallCode:=I_Getstt
0967       Regs.a:=path
0973       Regs.b:=ss_styp
097F       RUN SysCall(CallCode,Regs)
098E       one:=Regs.a \(* contains screen type code
09B5       RETURN
09B7
09B8 8000 CallCode:=I_Getstt
09C3       Regs.a:=path
09CF       Regs.b:=ss_fbrg
09DB       RUN SysCall(CallCode,Regs)
09EA       one:=Regs.a \(* contains foreground palette reg. no.
0A1C       two:=Regs.b \(* contains background palette reg. no.
0A4E       three:=Regs.x \(* least sig. byte of border palette no.
0A81       RETURN
0A83
0A84 9000 CallCode:=I_SetStt
0A8F       Regs.a:=path
0A9B       Regs.b:=ss_mtyp
0AA7       Regs.x:=one \(* contains monitor type
0ACB       RUN SysCall(CallCode,Regs)
0ADA       RETURN
0ADC
0ADD 10000 IF action="_gs_opt" THEN act:=1000
0AFB       ELSE IF action="_ss_ssig" THEN act:=2000
0B1A         ELSE IF action="_ss_rel" THEN act:=3000
0B38           ELSE IF action="_ss_scsiz" THEN act:=4000
0B58             ELSE IF action="_gs_palt" THEN act:=5000
0B77               ELSE IF action="_mgpb" THEN act:=6000
0B93                 ELSE IF action="_styp" THEN act:=7000
0BAF                   ELSE IF action="_fbrg" THEN act:=8000
0BCB                     ELSE IF action="_mtyp" THEN act:=9000
0BE7                       ENDIF
0BE9                     ENDIF
0BEB                   ENDIF
0BED                 ENDIF
0BEF               ENDIF
0BF1             ENDIF
0BF3           ENDIF
0BF5         ENDIF
0BF7       ENDIF
0BF9       RETURN
0BFB
```

About Your Subscription

Your copy of THE RAINBOW is sent second class mail. You must notify us of a new address when you move. Notification should reach us no later than the 15th of the month prior to the month in which you change your address. Sorry, we cannot be responsible for sending another copy when you fail to notify us.

Your mailing label also shows an account number and the subscription expiration date. Please indicate this account number when renewing or corresponding with us. It will help us help you better and faster.

For Canadian and other non-U.S. subscribers, there may be a mailing address shown that is different from our editorial office address. Do not send any correspondence to that mailing address. Send it to our editorial offices at Falsoft, Inc., The Falsoft Building, P.O. Box 385, Prospect, KY 40059. This applies to everyone *except* those whose subscriptions are through our distributor in Australia.



Racksellers

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

ALABAMA	
Birmingham	Jefferson News Co.
Brewton	McDowell Electronics
Florence	Anderson News Co.
Greenville	M & B Electronics
Madison	Madison Books
Montgomery	Trade 'N' Books
Tuscaloosa	Injun John's, Inc.
ALASKA	
Fairbanks	Arrow Appliance/Radio Shack
	Electronic World
ARIZONA	
Cottonwood	A & W Graphics Co.
Lake Havasu City	Book Nook
Phoenix	TRI-TEK Computers
Tempe	Books, Etc.
	Computer Library
Tucson	Anderson News Co.
ARKANSAS	
Fayetteville	Vaughn Electronics/Radio Shack
Ft. Smith	Hot Off the Press Newsstand
Little Rock	Anderson News Co.
CALIFORNIA	
Berkeley	Lyon Enterprises
Citrus Heights	Software Plus
Grass Valley	Advance Radio, Inc.
Hollywood	Levity Distributors
	Stef-Jen, Inc.
La Jolla	Butler & Mayes Booksellers
Los Angeles	Circus of Books (2 Locations)
Marysville	Bookland
Napa	Bookends Bookstore
Oakland	DeLauer's News Agency
Rancho Murieta	Software Plus
Sacramento	Deibert's Readerama
	Tower Magazine
San Francisco	Booksmith
	Bookworks
	Castro Kiosk
Santa Monica	Midnight Special Bookstore
San Jose	Computer Literacy Bookshops
Santa Rosa	Sawyer's News, Inc.
Stockton	Harding Way News
	Paperbacks Unlimited
Sunnyvale	Computer Literacy
Torrance	El Camino College Bookstore
COLORADO	
Aurora	Aurora Newsstand
Colorado Springs	Hathaway's
Denver	News Gallery
Glenwood Springs	The Book Train
Grand Junction	Readmore Book & Magazine
Longmont	City Newsstand
DELAWARE	
Middletown	Delmar Co.
Newark	Newark Newsstand
Wilmington	Normar, Inc.—The Smoke Shop
DISTRICT OF COLUMBIA	
Washington, DC	Chronichles
	News Room
	World News, Inc.
FLORIDA	
Boca Raton	Great American Book Co.
Clearwater	The Avid Reader
Cocoa	The Open Door
Dania	Dania News & Books
Davie	Software Plus More
Ft. Lauderdale	Bob's News & Book-Store
	Clarks Out of Town News
	Mike's Electronics Distributor
Gainesville	Paper Chase
Jacksonville	Book Co.
North Miami Beach	Almar Bookstore
Panama City	Boyd-Ebert Corp.
Pensacola	Anderson News Co.
Pinellas Park	Wolf's Newsstand
South Pasadena	Poling Place Bookstore
Starke	Record Junction, Inc.
	Radio Shack Dealer
Sunrise	Sunny's at Sunset
Tallahassee	Anderson News Co.
	DuBey's News Center
Titusville	Computrac
GEORGIA	
Atlanta	Border's
Bremen	Bremen Electronics/Radio Shack
Forest Park	Ellers News Center
Jesup	Radio Shack
Thomasville	Smokehouse Newsstand
Toccoa	Martin Music Radio Shack
IDAHO	
Boise	Book Shelf, Inc.
Moscow	Johnson News Agency
ILLINOIS	
Belleville	Software or Systems
Champaign	Bookmark
Chicago	B. Dalton Booksellers
Decatur	Book Emporium
	K-Mart Plaza
	Northgate Mall
East Moline	Book Emporium
Evanston	Norris Center Bookstore
Kewanee	Book Emporium
Lisle	Book Nook
Lombard	Empire Periodicals
Newton	Bill's TV Radio Shack
Paris	Book Emporium
Peoria	Book Emporium
	Sheridan Village
	Westlake Shopping Center
	Illinois News Service
Springfield	Book Emporium
	Sangamon Center North
	Town & Country Shopping Ctr.
Sunnyland	Book Emporium
West Frankfort	Paper Place
Wheeling	North Shore Distributors
INDIANA	
Angola	D & D Electronics
	Radio Shack
Berne	White Cottage Electronics
Bloomington	Book Corner
Columbus	Micro Computer Systems, Inc.
Crawfordsville	Koch's Books
Dyer	Miles Books
Franklin	Gallery Book Shop
Ft. Wayne	Michiana News Service
Garrett	Finn News Agency, Inc.
Indianapolis	Bookland, Inc.
	Borders Bookshop
	Delmar News
	Indiana News
	Southside News
Lebanon	Gallery Book Shop
Martinsville	Radio Shack
Richmond	Voyles News Agency, Inc.
Wabash	Mitting's Electronics
IOWA	
Davenport	Interstate Book Store
Des Moines	Thackery's Books, Inc.
Fairfield	Kramers Books & Gifts
KANSAS	
Hutchinson	Crossroads, Inc.
Topeka	Palmer News, Inc.
	Town Crier of Topeka, Inc.
Wellington	Dandy's/Radio Shack Dealer
Wichita	Lloyd's Radio
KENTUCKY	
Hazard	Daniel Boone Gulf Mart
Henderson	Matt's News & Gifts
Hopkinsville	Hobby Shop
Louisville	Hawley-Cooke Booksellers (2 Locations)
Middletown	Software City
Paducah	Radio Shack
LOUISIANA	
Baton Rouge	City News Stand
Lockport	TV Doctor/Radio Shack
New Orleans	Sidney's News Stand Uptown
Monroe	The Book Rack
MAINE	
Bangor	Magazines, Inc.
Brockton	Voyager Bookstore
Caribou	Radio Shack
Oxford	Books-N-Things
Sanford	Radio Shack
MARYLAND	
College Park	University Bookstore
MASSACHUSETTS	
Boston	Eastern Newsstand
Brockton	Voyager Bookstore
Cambridge	Out Of Town News
MASSACHUSETTS (cont'd)	
Ipswich	Ipswich News
Littleton	Computer Plus
Lynn	North Shore News Co.
Swansea	Newsbreak, Inc.
MICHIGAN	
Allen Park	Book Nook, Inc.
Birmingham	Border's Book Shop
Durand	Robbins Electronics
E. Detroit	Merit Book Center
Harrison	Harrison Radio Shack
Hillsdale	Electronics Express/Radio Shack
Holland	Fris News Company
Lowell	Lowell Electronics
Muskegon	The Eight Bit Corner
Niles	Michiana News Service
Perry	Perry Computers
Riverview	Riverview Book Store
Roseville	New Horizons Book Shop
MINNESOTA	
Burnsville	Shinder's Burnsville
Crystal	Shinder's Crystal Gallery
Edina	Shinder's Leisure Lane
Minneapolis	Shinder's (2 Locations)
Minnetonka	Shinder's Ridge Square
Roseville	Shinder's Roseville
St. Paul	Shinder's Annex
	Shinder's Maplewood
	Shinder's St. Pauls
Willmar	The Photo Shop
MISSOURI	
Farmington	Ray's TV & Radio Shack
Flat River	Ray's TV & Radio Shack
Florissant	Book Brokers Unlimited
Jefferson City	Cowley Distributing
Kirksville	T&R Electronics
St. Louis	Book Emporium
St. Robert	Bailey's TV & Radio
MONTANA	
Butte	Plaza Books
NEBRASKA	
Lincoln	Nebraska Bookstore
Omaha	Nelson News
NEVADA	
Carson City	Bookcellar
Las Vegas	Hurley Electronics
	Steve's Books & Magazines
NEW HAMPSHIRE	
Keene	Radio Shack Associate Store
Manchester	Bookwrights
West Lebanon	Verham News Corp.
NEW JERSEY	
Atlantic City	Atlantic City News Agency
Cedar Knolls	Village Computer & Software
Clinton	Micro World II
Pennsville	Dave's Elect. Radio Shack
Rockaway	Software Station
NEW MEXICO	
Alamogordo	New Horizons Computer Systems
Albuquerque	Page One Newsstand
Santa Fe	Downtown Subscription
NEW YORK	
Amherst	Village Green-Buffalo Books
Brockport	Lift Bridge Book Shop, Inc.
Brooklyn	Cromland, Inc.
Elmira Heights	Southern Tier News Co., Inc.
Fredonia	On Line: Computer Access Center
Hudson Falls	G.A. West & Co.
Huntington	Oscar's Bookshop
Johnson City	Unicorn Electronics
New York	Barnes & Noble—Sales Annex
	Coliseum Books
	Eastern Newsstand
	Grand Central Station, Track 37
	200 Park Ave., (Pan Am #1)
	55 Water Street
	World Trade Center #2
	First Stop News
	Idle Hours Bookstore
	International Smoke Shop
	Jonil Smoke
	Penn Book
	Software City
	State News
	Walden Books
	World Wide Media Services
Pawling	Universal Computer Service
Rochester	Village Green
	World Wide News

NORTH CAROLINA

Cary	News Center in Cary Village
Chapel Hill	University News & Sundry
Charlotte	Newsstand Int'l
Hickory	C^2 Books & Comics
Jacksonville	Michele's, Inc.
Kernersville	K & S Newsstand
Marion	Boomers Rhythm Center
Winston-Salem	K & S Newsstand (3 Locations)
	Rainbow News Ltd.

OHIO

Akron	Churchill News & Tobacco
Canton	Little Professor Book Center
Chardon	Thrasher Radio & TV
Cincinnati	Cinsoft
Cleveland	Erieview News
Columbiana	Fidelity Sound & Electronics
Columbus	B5 Software
	Micro Center
	The Newsstand
Dayton	Books & Co.
	Huber Heights Book & Card
	Wilke News
	Wright News & Books
Dublin	Book Barn
Fairborn	News-Readers
	Wilke's University Shoppe
Findley	Open Book
Kent	The News Shop
Lakewood	Lakewood International News
Lima	Edu-Caterers
Miamisburg	Wilke News
Parma	Bookmark Newscenter
Toledo	Leo's Book & Wine Shop
Warren	Book Nook, Inc.
Xenia	Fine Print Books
Youngstown	Plaza Book & Smoke Shop

OKLAHOMA

Oklahoma City	Merit Micro Software
Taklequah	Thomas Sales, Inc. dba Radio Shack
Tulsa	Steve's Book Store

OREGON

Eugene	Libra Books — Book Mark
Portland	Fifth Avenue News
	Rich Cigar Store, Inc.
	Sixth & Washington News
Salem	Capitol News Center
	Checkmate Book

PENNSYLVANIA

Allentown	Owl Services
Altoona	Newborn Enterprises
Bryn Mawr	Bryn Mawr News
Corry	Corry Books & Cards
Danville	McIndoe's Stationery & Radio Shack
Feasterville	Global Books
King of Prussia	Gene's Books
Malvern	Personal Software
Reading	Smith's News & Card Center
Temple	Software Corner
West Chester	Chester County Book Co.
Wind Gap	Micro World
York	The Computer Center of York
	Tollgate Bookstore

RHODE ISLAND

Newport	Bellevue News

SOUTH CAROLINA

Charleston Hts.	Software Haus, Inc.
Clemson	Clemson Newsstand
Florence	Ray's #1
Greenville	Palmetto News Co.
Spartanburg	Software City

TENNESSEE

Brentwood	Bookworld #5
Chattanooga	Anderson News Co.
	Guild Books & Periodicals
Dickson	Highland Electronics
Knoxville	Anderson News Co.
	Davis-Kidd Bookseller
Memphis	Computer Center
Nashville	Davis-Kidd Booksellers
	Mosko's Place
	R.M. Mills Bookstore
Smyrna	Delker Electronics

TEXAS

Big Spring	Poncho's News
Desoto	Maxwell Books
Elgin	The Homing Pigeon
Harlington	Book Mark

UTAH

Provo	Valley Book Center

VIRGINIA

Danville	K & S Newsstand
Hampton	Benders
Norfolk	I-O Computers
	Turn The Page
Richmond	Volume I Bookstore

WASHINGTON

Port Angeles	Port Book & News
Seattle	Adams News Co., Inc.
	Bulldog News
Tacoma	B & I Magazines & Books
	Nybbles 'N Bytes

WEST VIRGINIA

Huntington	Nick's News
Logan	Stan's Electronics & Radio Shack
Madison	Communications, LTD
Parkersburg	Valley News Service
South Charleston	Spring Hill News

WISCONSIN

Appleton	Badger Periodicals
Cudahy	Cudahy News & Hobby
Kenosha	R.K. News, Inc.
Madison	Pic A Book
	University Bookstore
Milwaukee	Juneau Village Reader
Waukesha	Holt Variety

ARGENTINA

Cordoba	Information Telecommunicationes

AUSTRALIA

Blaxland	Blaxland Computers
Kingsford	Paris Radio Electronics

CANADA:
ALBERTA

Banff	Banff Radio Shack
Bonnyville	Paul Tercier
Brooks	Double "D" A.S.C. Radio Shack
Calgary	Billy's News
Claresholm	Radio Shack Associated Stores
Drayton Valley	Langard Electronics
Edmonton	CMD Micro
Edson	Radio Shack, asd
Fairview	D.N.R. Furniture & TV
Fox Creek	Fox City Color & Sound A.S.C. Radio Shack
Ft. Saskatchewan	Ft. Mall Radio Shack, ASC
Grande Cache	The Stereo Hut
Grande Centre	The Book Nook
Hinton	Jim Cooper
Innisfail	L & S Stereo
Lecombe	Brian's Electronics
Leduc	Radio Shack Associated Stores
Lethbridge	Datatron
Lloydminster	Lloyd Radio Shack
Okotoks	Okotoks Radio Shack
Peace River	Radio Shack Associated Stores
	Tavener Software
St. Paul	Walter's Electronics
Stettler	Stettler Radio Shack
Strathmore	Wheatland Electronics
Taber	Pynewood Sight & Sound
Westlock	Westlock Stereo
Wetaskiwin	Radio Shack

BRITISH COLUMBIA

Burnaby	Compulit
Burns Lake	VT. Video Works
Campbell River	TRS Electronics
Chilliwack	Charles Parker

BRITISH COLUMBIA (cont'd)

Coquitlam	Cody Books LTD
Coortenay	Rick's Music & Stereo
Dawson Creek	Bell Radio & TV
Golden	Taks Home Furnishings
Kelowna	Telesoft Marketing
Langley	Langley Radio Shack
Nelson	Oliver's Books
New Westminster	Cody Books LTD
Parksville	Parksville TV
Penticton	D.J.'s
	Four Corner Grocery
Sidney	Sidney Electronics
Smithers	Wall's Home Furniture
Squamish	Kotyk Electronics
Vancouver	Active Components
	Friendlyware Computers
	Granville Book Co.
	Siliconnections Books LTD
100 Mile House	Tip Top Radio & TV

MANITOBA

Altona	L.A. Wiebr Ltd.
Lundar	Goranson Elec.
Morden	Central Sound
The Pas	Jodi's Sight & Sound
Selkirk	G.L. Enns Elec.
Virden	Archer Enterprises
Winnipeg	J & J Electronics Ltd.

NEW BRUNSWICK

Moncton	Jeffries Enterprises
Sussex	Dewitt Elec.

NEWFOUNDLAND

Botwood	Seaport Elec.
Carbonear	Slade Realties

NOVA SCOTIA

Halifax	Atlantic News

ONTARIO

Angus	Micro Computer Services
Aurora	Compu Vision
Concord	Ingram Software
Exceter	J. Macleane & Sons
Hanover	Modern Appliance Centre
Huntsville	Huntsville Elec.
Kenora	Donny "B"
Kingston	T.M. Computers
Listowel	Modern Appliance Centre
South River	Max TV
	Dennis TV
Toronto	Gordon and Gotch

QUEBEC

LaSalle	Messageries de Presse Benjamin Enr.
Pont. Rouge	Boutique Bruno Laroche
Ville St. Gabriel	Gilles Comeau Enr/Radio Shack

SASKATCHEWAN

Assiniboia	Telstar News
Estevan	Kotyk Electronics
Moose Jaw	D&S Computer Place
Nipiwan	Cornerstone Sound
Regina	Regina CoCo Club
	Software Supermarket
Saskatoon	Everybody's Software Library
Shellbrooke	Gec. Laberge Radio Shack
Tisdale	Paul's Service
Unity	Grant's House of Sound

YUKON

Whitehorse	H & O Holdings

JAPAN

Tokyo	America Ado, Inc.

PUERTO RICO

San Juan	Software City

Also available at all B. Dalton Booksellers, and selected Coles and W.H. Smith in Canada, Waldenbooks, Pickwick Books, Encore Books, Barnes & Noble, Little Professors, Tower Book & Records, Kroch's & Brentano's, and Community Newscenters.

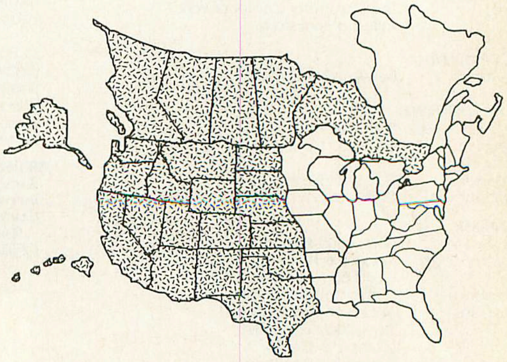
Advertisers Index

We encourage you to patronize our advertisers — all of whom support the Tandy Color Computer. We will appreciate your mentioning **THE RAINBOW** ***when you contact these firms.***

4-TECHS 129
Adventure Novel 67
After Five Software 143
Alpha Products 21
Bob's Software 45
Burke & Burke 161
Cer-Comp 122, 123
Cinsoft 39
CoCo Cat Anti-Drug 12
CocoTech 41
Codis Enterprises 81
Cognitec 29
Colorware 18, 19, 22, 23
Computer Center 93
Computer Island 69
Computer Plus 3
D.P. Johnson 179
DATAMATCH, INC. 75
Dayton Associates of
W. R. Hall, Inc. 130, 131
Delphi 118, 119
Diecom .... IFC
Disto/CRC 113
Dr. Preble's Programs .... IBC
E-Z Friendly Software 177
Easy Street Data Systems 171
Federal Hill 101
FoxWare 95
Frank Hogg Laboratory 46, 47
GEnie 43
Gimmesoft 61
Granite Computer Systems 45
Hard Drive Specialist 155
Hawkes Research
Services 101
HawkSoft, Inc. 49
Howard Medical 66, 94
J & R Electronics 97
Metric Industries 55
Micro Works, The 63
Microcom Software 9, 11, 13, 15, 17
Microtech Consultants
Inc. 181
MicroWorld 57
NRI Schools 99
Owl-Ware 145, 146, 147
Performance Peripherals 121
Perry Computers 111
Public Domain 73
PXE Computing 7
Rainbow Binder 188
Rainbowfest 50, 51
Rainbow Introductory Guide
to Statistics 74
Rainbow on Tape and Disk 52
RAM Electronics 81
RTB Software 129
Rulaford Research 149
Sardis Technologies 173
SD Enterprises 25
Second City Software 193
SpectroSystems 75
SPORTSWARE 95
Sugar Software 164
Sundog Systems 27
T & D Software 30, 31, 135
Tandy/Radio Shack .... BC
Tepco 185
Three C's Projects 169
True Data Products 174, 175
Vidicom Corporation 177
Wasatchware 49
Woodstown Electronics 39
Zebra Systems 65

▨ **Call:**
Belinda Kirby
Advertising Representative
The Falsoft Building
9509 U.S. Highway 42
P.O. Box 385
Prospect, KY 40059
(502) 228-4497

☐ **Call:**
Kim Vincent
Advertising Representative
The Falsoft Building
9509 U.S. Highway 42
P.O. Box 385
Prospect, KY 40059
(502) 228-4492



Second City Software

'your FIRST choice for CoCo software...'

P.O.Box 72956 Roselle, IL 60172
Order: 312·653·5610 BBS: 312·307·1519

CoCo CALENDER
Organize all of your appointments with this 365 day CoCo Calender. 64k DISK..............$9.95

BLACKJACK ROYALE
Even your casino odds with this BlackJack card simulation and tutor! Program can be edited for different 'house rules'. 64k DISK........$16.95

BSE - BASIC SCREEN EDITOR
Gives Basic a full-screen editor to supplement the regular EDIT commands. Works on the CoCo 1 2 and with the CoCo 3, width 32, 40 or 80 is supported! Complete screen cursor control with the arrow keys + features to make EDITing Basic programs a snap! BSE, a must have CoCo utility. Our low price was the only corner that was cut on this quality program. 64k DISK........$19.95

CHECK-09
Finally, a program that interacts with MultiVue for FAST and EASY check balancing. CHECK-09 and you can now take control of your bank checking account. No more waiting on your bank statement for an ending balance. CHECK-09 will provide a check-by-check balance in an easy to use format that eliminates those monthly surprizes! Bring your money and you closer together and have the buck STOP HERE. 512K DISK w/MultiVue.....$22.95

CoCoMAX II by Colorware
The 'CLASSIC' CoCo 1 & 2 graphic program. Draw great works of art with the program that set a standard for all others to follow. Supported by Hi-Res interface and numerous printer drivers for complete configuration. 64k DISK.....$78.45

CoCoMAX III by Colorware
All new program based off the 'CLASSIC' CoCoMax II software. Allows for full animation, select 16 colors from a 64 color palette, fast & easy to use w/pull down menus in a point-and-click environment. 128k DISK..................$78.45

CoCo KEYBOARD
Program allows the user to utilize the function keys on the HJL-57 Professional, Deluxe CoCo, and Micronix keyboard. 32k DISK...........$6.95

TELEPATCH
Turn Telewriter 64 into the best Word Processor for the CoCo! TELEPATCH is compatible with all CoCo's. Comes with complete documentations for easy upgrading. 64k DISK.................$24.95

HI-RES FONT MODIFIER
Create, modify, save and re-use as many CoCo 3 fonts that you can imagine. 128k DISK....$14.95

COLOR MAX III FONT EDITOR
Allows you to custom create your own special ColorMax 3 fonts. Program and manual is easy to use for outstanding results! 128k DISK...$19.95

SCHEMATIC DRAFTING PROCESSOR
A 'FAST' and 'EASY TO USE' ELECTRONIC DRAFTING PROCESSOR. Create pro-looking diagrams using a 480 x 540 pixel screen with 6 viewing windows! Over '30' electronic symbols with 10 definable symbols. Even supports Logic gates & Multipin chips! Print hardcopy or save to disk for later use. 64k DISK...........................$22.95

OS-9 SOLUTION
Tame the hostile environment of OS-9 with OS-9 SOLUTION! Replaces 20 of the command calls with single keystroke, menu driven commands. No more typing in long and complex pathnames or complicated syntaxes to remember! Works with either OS-9 Level One or Two............$24.95

TAPE/DISK UTILITY
A utility package that transfers TAPE to DISK or DISK to TAPE automatically. If you just got your first disk drive, TAPE/DISK is a MUST HAVE program. Will print tape & disk directories to any supported printer...................$19.95

ADOS-3
The 'popular' ADOS-2 just got better ...... with ADOS-3 ..... SECOND CITY SOFTWARE special introductory price. 128K DISK................$32.95

FAST DUPE 2
Backup & Format as many copies of your original disk that you need. FAST DUPE 2 reads source into memory for fast and realible disk transfer Supports up to 4 disk drives! 64k DISK...$19.95

MY-DOS by Chris Hawks
Supports accesses to double sided drives, able to use the J&M controller with the CoCo 3, DIR command simplified and a host of other special features. 64k DISK......................$14.95

VIP LIBRARY
This popular 'integrated' package includes, VIP writer, Terminal, DataBase, Calc and Disk Zap which can fix a diskette with I/O errors. SCS special price. 64k DISK................$125.00

SOFTWARE SPOOLER & RAM DISK
Quick response or no disk swapping drive backups for 1 drive system and printer spooler to free computer during printing. For CoCo 3 with 512k DISK..............................$19.45

THE NEWSPAPER
Use your CoCo 3 for 'Desk Top Publishing'! The Newspaper is a complete & sophisticated program for creating Banners, Headlines & Text columns. Allows for importing different pictures, fonts & full patterns from disk for that professional look! Includes 22 fonts and 50 pictures. This one of a kind program has over 140k of program code! 128k DISK.........................$39.95

SECOND CITY SOFTWARE accepts Master Card, VISA C.O.D. and CHECK orders. Please add $2.50 for shipping. Allow 2 to 4 weeks for delivery.

HOWARD MEDICAL COMPUTERS

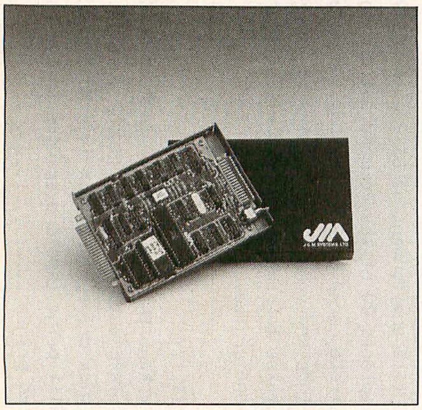
1690 N. Elston • Chicago, IL 60622 • ORDERS (800) 443-1444 • INQUIRIES AND ORDER STATUS (312) 278-1440

★ 5 STAR FINAL AUGUST '88 CLEAR

HD-1 Sale Ends 9/3

DC-5 CONTROLLER

from Hard Drive Specialist gives great Radio Shack compatability and double sided access to DSDD Drives like Howard's DD-3. Two ROM sockets, one 24 pin and one 28 pin allows use of RS 1.1 ROM by jumper selection. Gold plated contacts reduce I/O Errors. **$75** ($2 Shipping)



RS DOS ROM CHIP

ROM chip fits inside disk controller. 24 pin fits both J&M and RS controller Release 1.1. For CoCo 3 Compatibility. $25 each Reg. $40 ($2 shipping)

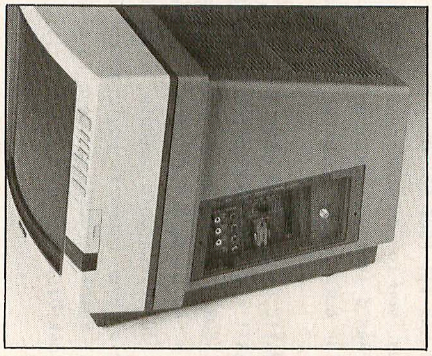
NEW FROM DISTO $129 DC6 ($2 Shipping) Super Controller II works with CoCo 1, 2 & 3. It buffers keyboard input so that no keystrokes are lost when disk is reading or writing. Especially useful with OS-9, but also works with BASIC.

MONITOR

Sony KV-1311CR $499

Regular $625 ($15 shipping)

• Vivid Color • Vertically flat 13″ screen • Monitor/Trinitron TV with remote control • 640 × 240 resolution at 15MHZ .37 mm Dot pitch • RGB analog & digital; TTL; and composite inputs • VCR inputs • Cable to CoCo 3 $36



WORD PACK RS $49

CoCo Max $78.45

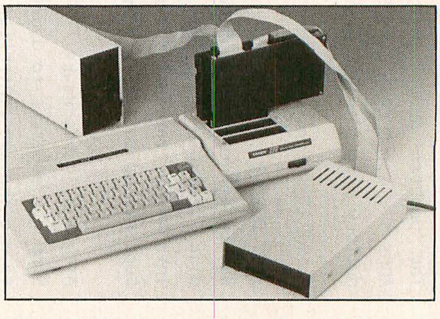
Basic Screen Editor $19.95

MYDOS $15

Payrol/BAS $29.95

VIP Library $125

VIP Writer $65



Hard Drive–Ready to Run!

20,000,000 Bytes or the equivalent to a 125 R.S. 501's on line are packed into this hard drive, pre installed and ready to run. All you need to do is plug it in and go! This complete easy to use package includes a Seagate 20 Meg Hard Drive, a Western Digital WD 1002-WX 1 Controller and interface that plugs into slot #3 of multipack interface, plus the case & power supply. You even get a 1 year warranty. This 20 meg Hard Drive will work with IBM & clone. Basic driver, $49.95, lets you access this hard drive without need for OS-9. Howard's low price is aimed to get as many units as possible into the hands of "evaluators" to spread the word on it's quality.

HD-1 $499 ($9 Shipping)

Sale ends September 3

"Guarantee" As good as Gold.

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.

hotline number

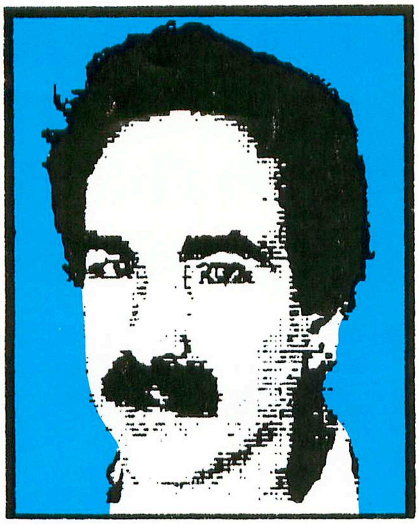
DON'T MISS OUT, ORDER TODAY!

800 / 443-1444

WE ACCEPT VISA • MASTERCARD • AMERICAN EXPRESS • C.O.D. OR CHECKS • SCHOOL P.O.

Dr. Preble's Programs

For Color Computer Software
Since 1983



Dear Friends,

Thank you. 1988 marks our fifth year of providing quality software for the Color computer. Only your support has made it possible. So, from our hearts, Peg and I thank you. And remember our promise--If you buy it from us, we support it. If you are unhappy for any reason, send it back for a full refund within 30 days of purchase.

Pyramix

This facinating CoCo 3 game continues to be one of our best sellers. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of Color-Venture.

The Freedom Series

Vocal Freedom

I've got to admit, this is one nifty computer program. Vocal Freedom turns your computer into a digital voice or sound recorder. The optional **Hacker's Pac** lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message-minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the pre-recorded message! Disk operations are supported. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifiler (RS cat. #277-1008) and any microphone.

Mental Freedom

Would your friends be impressed if your computer could read their minds? Mental Freedom uses the techniques of Biofeedback to control video game action on the screen. Telekinesis? Yes, you control the action with your thoughts and emotions. And, oh yes, it talks in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675.

BASIC Freedom

Do you ever type in BASIC programs--manually, I mean. If you do, you know it can be a real chore. Basic Freedom changes all that. It gives you a full screen editor just like a word processor, but for BASIC programs. Once loaded in, it is always on-line. It hides invisibly until you call it forth with a single keypress! This program is a must for programers or anyone who types in programs. By Chris Babcock and a product of Color-Venture.

Lightning Series

These three utilities give real power to your CoCo 3.

Ramdisk Lightning

This is the best Ramdisk available. It lets you have up to 4 mechanical disk drives and 2 Ram drives on-line and is fully compatible with our printer spooler below.

Printer Lightning

Load it and forget it--except for the versatility it gives you. Never wait for your printer again! Printer runs at high speed while you continue to work at the keyboard!

Backup Lightning

This utility requires 512K. Reads your master disk once and then makes superfast multiple disk backups on all your dirves! No need to format blank disks first! Supports 35, 40 or 80 track drives.

Prices

CoCo 3 only

Ram Disk Lightning, Disk	$19.95
Printer Lightning Disk	$19.95
Backup Lightning, Disk	$19.95
All three, Disk	$49.95
Pyramix, Disk	$24.95

CoCo 1,2, or 3

Vocal Freedom, Disk	$34.95
Vocal Freedom Hackers Pac	$14.95

CoCo 2 or 3 only

Mental Freedom, Disk	$24.95
Basic Freedom, Disk	$24.95

CoCo 1 or 2 only

VDOS, The Undisk, ramdisk for the CoCo 1 or 2 only, Tape	$24.95
VDUMP, backup Undisk files to single tape file, Tape	$14.95
VPRINT, Print Undisk directory, Tape	$9.95

Everyone

Add $2.50 shipping/handling in USA or CANADA

Add $5.00 to ship to other countries

Dr. Preble's Programs
6540 Outer Loop
Louisville, KY 40228

24 Hour Hot Line
(502) 969-1818

Visa, MC, COD, Check

The Best in Color Computer Software

We've got the selection!

At Radio Shack, we're dedicated to making sure that you never run out of ways to use and enjoy your Color Computer. We've got a terrific line of software of all types.

Games for the whole family

Let your Color Computer open the door to a world of fun and adventure. Choose from a dazzling selection of popular and challenging games.

Make learning fun

One of the most valuable potentials of your Color Computer is in providing your children a head start in their education. We've got learning programs for children of all ages that will provide hours of productive fun! With this selection, you'll find programs that help develop hundreds of useful skills.

Boost your productivity

No matter what your personal needs, we've got programs that'll put your Color Computer to work where you need it most—like personal filing, word processing, spreadsheets and communications.

Need more suggestions?

Send in the coupon for a free copy of our 1989 Software Reference Guide. Radio Shack is your one-stop software center.

Radio Shack®
The Technology Store™
A DIVISION OF TANDY CORPORATION

Send me a new 1989 Software Guide.
Mail to: Radio Shack, Dept. 89-A-318
300 One Tandy Center, Fort Worth, TX 76102

Name ____________________
Address ____________________
City ____________________
State ____________________
ZIP ____________________
Phone ____________________

WHERE IN THE WORLD IS CARMEN SANDIEGO?
THE MICROSCOPIC MISSION
LASER SURGEON
SHANGHAI
EPYX
LUCASFILM GAMES
KORONIS RIFT
Flight Simulator II
LUCASFILM GAMES Rescue on Fractalus!
COLORMATH
ROGUE
SPRINGSTER
COLOR SCRIPSIT II
T/S SPELL
COLOR FILE II
DOWNLAND
Color Computer Artist
TANDY